TECHNOLOGY DEPT.

# Gas Journal

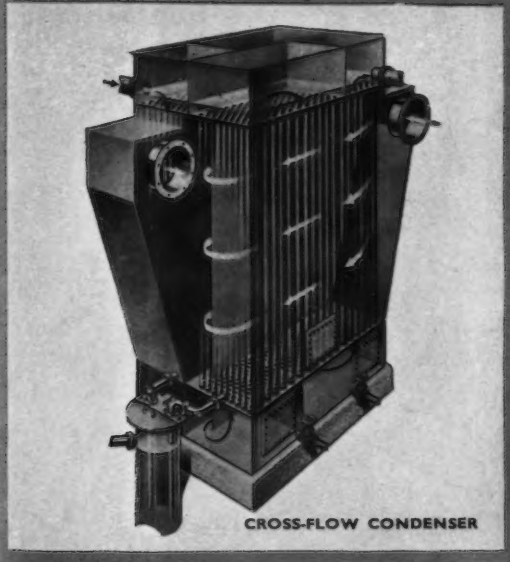
VOL. 277. 106TH YEAR. LONDON, MARCH 10, 1954 NO. 4736. PRICE 1/3


## WHESSOE

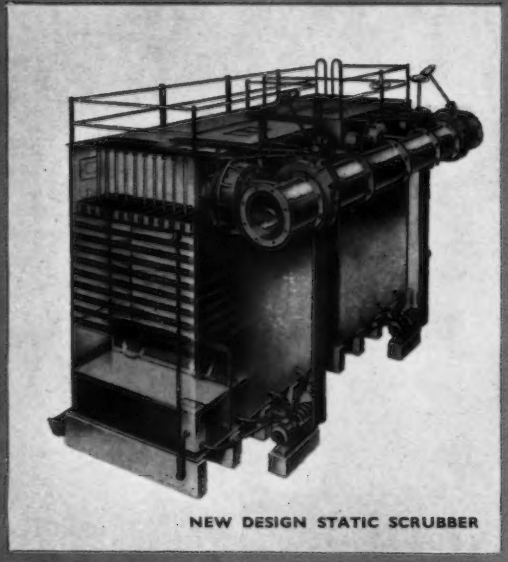
### TREATMENT PLANT FOR THE GAS & COKE OVEN INDUSTRIES

Whessoe design and build COMPLETE ANCILLARY PLANT for the treatment of all fuel gases. Many of these complete purification plants embody CONDENSERS, W.W-D. ELECTRO-DETARRERS and STATIC SCRUBBERS the features of which are illustrated on this page.

W.W-D. ELECTRO-DETARRER



CROSS-FLOW CONDENSER



NEW DESIGN STATIC SCRUBBER

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*in service with the North Eastern Gas Board*

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In rail gauges from 2 ft.—5 ft. 6 ins.

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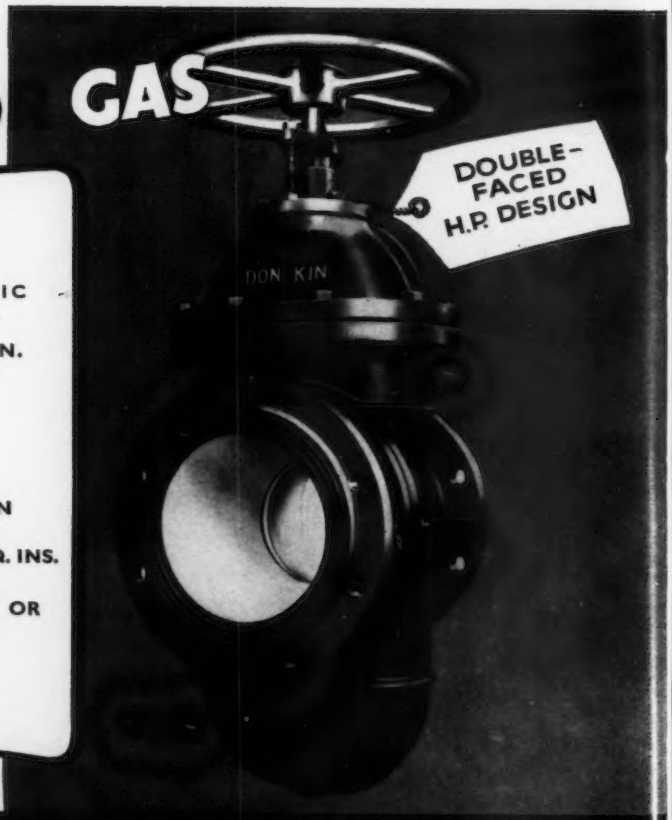


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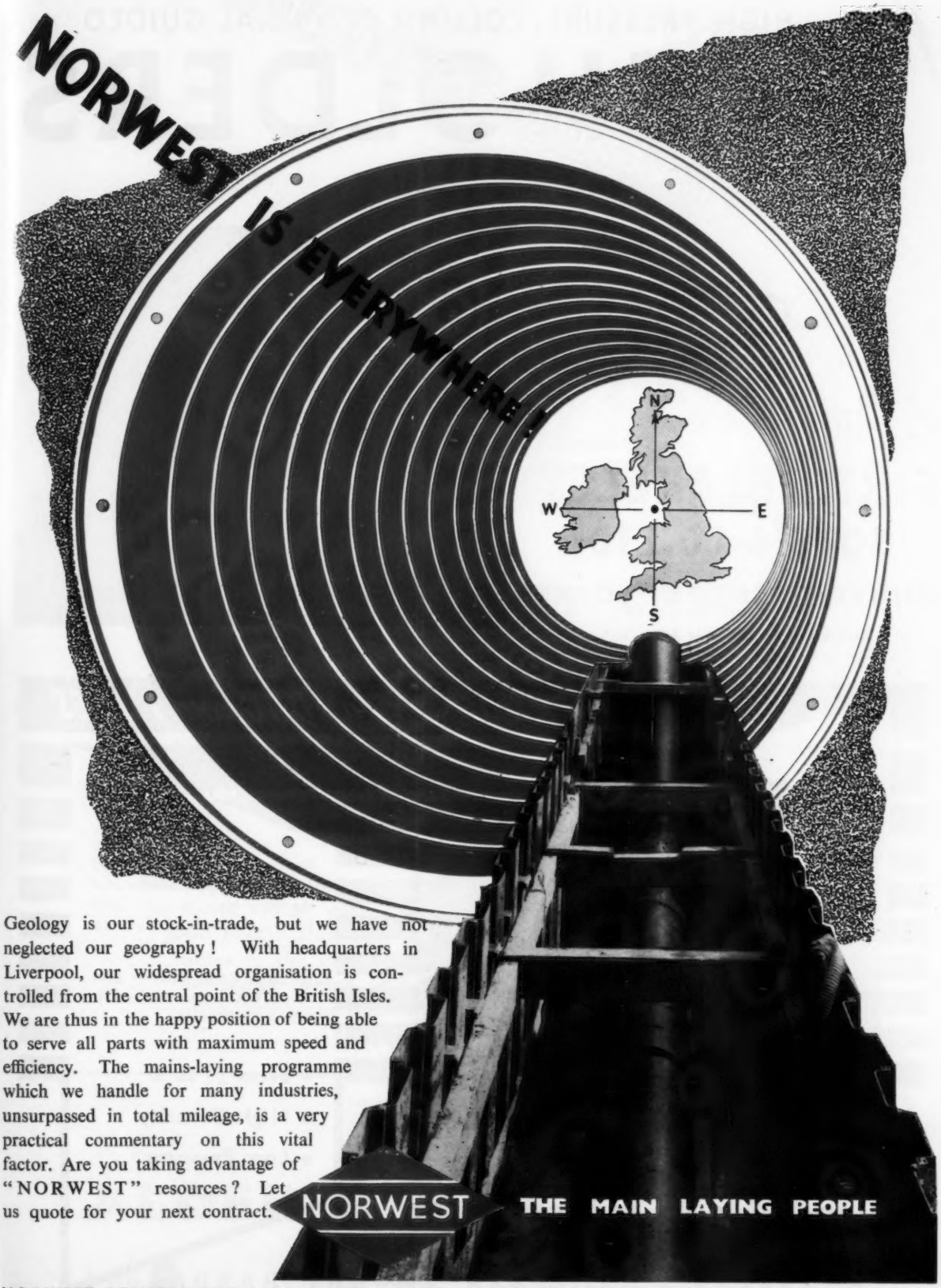


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Illustrated is the J.47 Service and Appliance Governor, and typical of the many types of JEAVONS Governors produced for ALL purposes.

The J.47 suits inlet pressures up to 22-inch W.G.; outlet pressure 2½-inch W.G. (adjustable).

- Sizes ¾" to 2"
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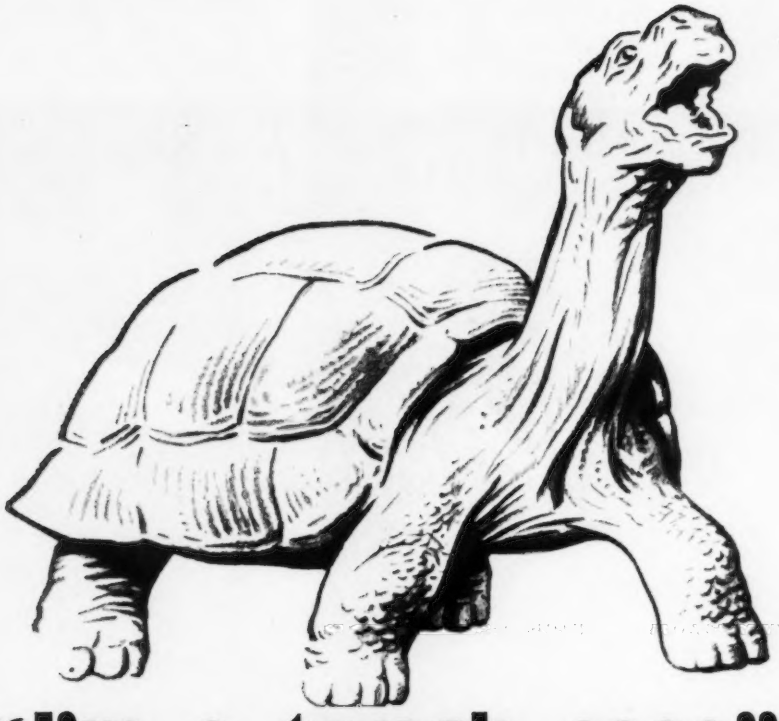
'GRAMS: PIPELINES, TIPTON



# "I'm a tough case"

Most people know a tortoise when they see one, but how many know the difference between a CRYPTODIRA and a PLEURODIRA? They differ in the way they draw their heads into their shells—the former by bending the neck vertically in an S-shaped curve, the latter (found only in the Southern hemisphere) by bending it sideways.

**Gas meters, like tortoises, must have a sound outer case; one of the good points about an 'A & M' gas meter is the extra tough, sturdy container which withstands the most rigorous treatment.**

Our improved coin meter available for pennies and shillings, sixpences and shillings, or half-crowns and shillings and readily adjustable for single coin operation at the engineer's option.

## ALDER & MACKAY LTD

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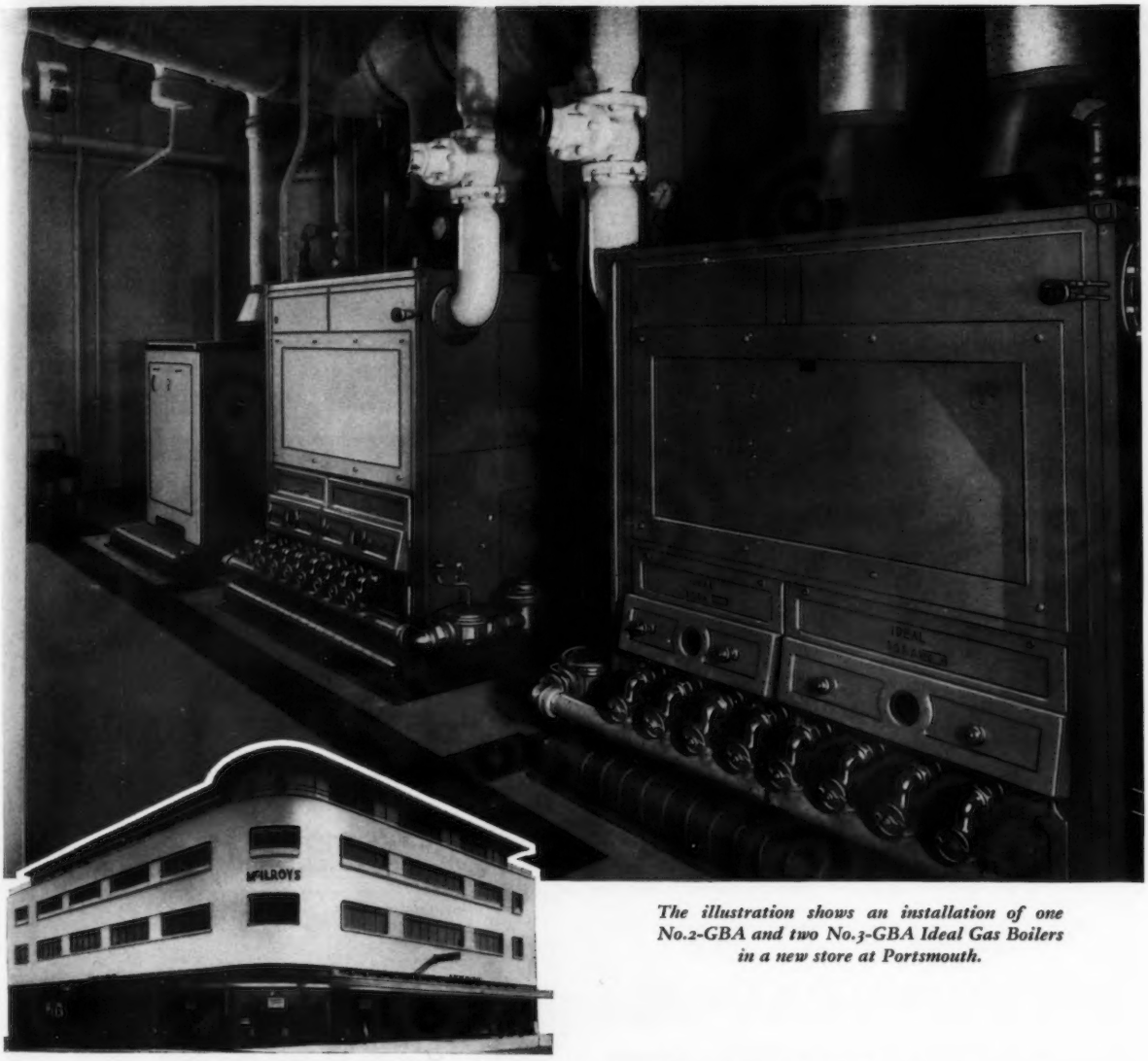
This coin plate has a setting range of 12 to 312 cu. ft. per shilling. A distinct advantage is the use of a single slot, through which both 6d. or 1/- coins, or both, can be taken by a simple adjustment of a clearly marked bracket located at the rear of the coin plate. The facilities for optional setting are clearly marked and the satin chrome and black finish on the embossed index plate is both attractive and durable. An ingenious cam action on the coin plate tends to draw the coins into the pocket.

## George Wilson Gas Meters Ltd.,

COVENTRY · JARROW · LONDON · MANCHESTER · WOLVERHAMPTON · GLASGOW




*The illustration shows an installation of one No.2-GBA and two No.3-GBA Ideal Gas Boilers in a new store at Portsmouth.*

## . . . designed for modern efficiency

High functional efficiency, clean, labour-saving operation and long, trouble-free service are the features which have created such a demand for the installation of Ideal Gas Boilers in reconstruction and new building throughout the country.

These boilers comply with the wishes of the Ministry of Town and Country Planning, and many local authorities, who encourage the installation of smokeless heating equipment in the interests of a clean, healthy atmosphere, now ardently desired by all.

In a range of 22 sizes, from 20,000 to 1,430,000 B.T.U. per hour, Ideal Gas Boilers are completely thermostatically controlled and have insulated jackets of steel or aluminium in appropriate finishes. They are the result of long experience and much research in this specialised type of heating and their growing popularity is a measure of their success.

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**RELIABLE AND LABOUR SAVING**

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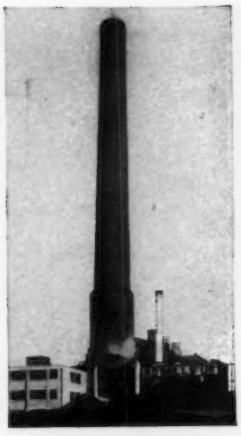
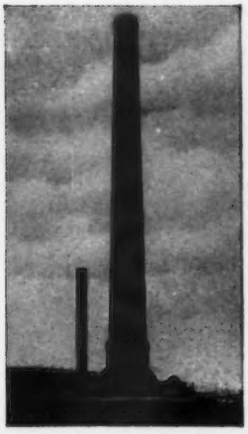
The successful completion of over 4 million feet of Bored Piling during the last fifteen years is an achievement which speaks for itself.

*Left : Trial borings for reconstruction of Coventry Cathedral.*





*Two of the largest chimneys in the British Isles; on foundations of Francois Concrete Piles (left) and Francois Cementation Piles (Right)*

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SINGLE TUBE PRESSURE GAUGES

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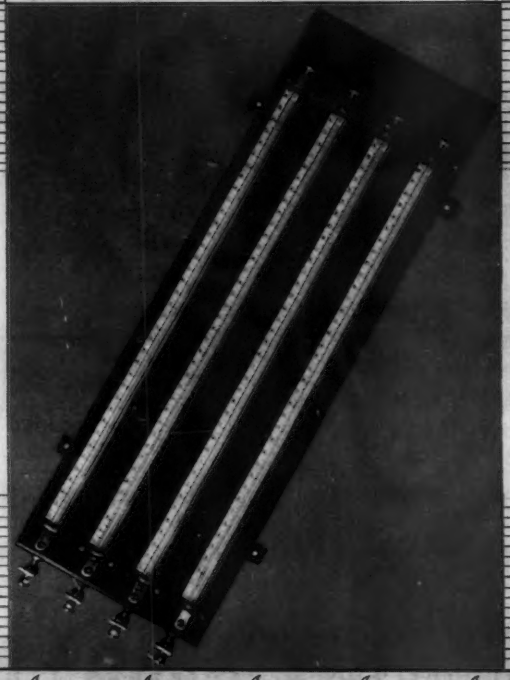

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PORTABLE SCREEN GAS FIRE

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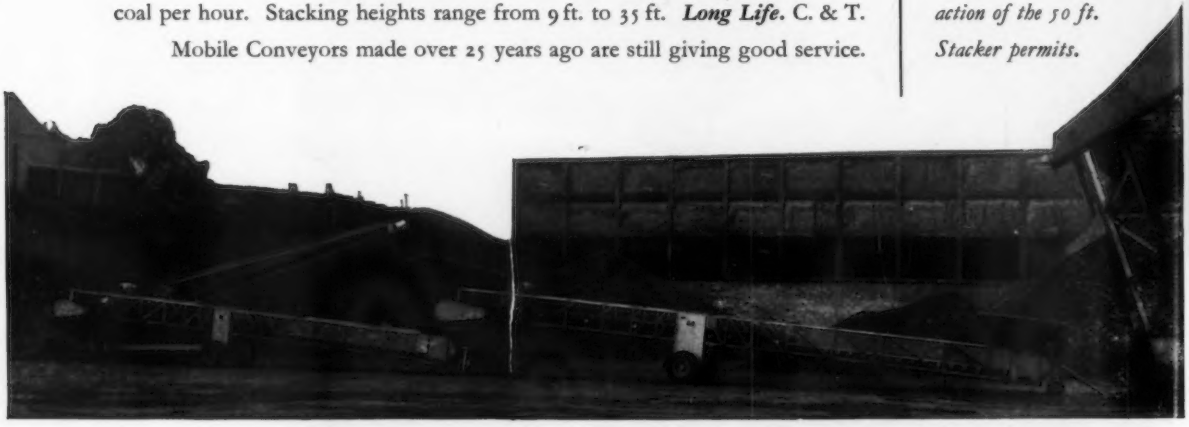
No need to waste time changing the position of the horizontal feed conveyors when stacking with C. & T. Super-Mobile Stackers. When a new discharge point becomes necessary the Stacker alone is moved. Its swivelling main wheels permit a radial movement of the discharge point without alteration of the feed point and this feature enables large stacks to be built up with the minimum possible movement of conveyors. Other outstanding features of C. & T. Stackers are :— ***High Mobility.*** They are instantly available for towing any distance along the highway. ***Wide Capacity Range.*** C. & T. standard machines are built in a number of types with capacity ranging from 50 to 300 tons of coal per hour. Stacking heights range from 9 ft. to 35 ft. ***Long Life.*** C. & T. Mobile Conveyors made over 25 years ago are still giving good service.

*In each of the adjoining photographs, the two 50 ft. C. & T. Horizontal Conveyors are seen to be in the same position, but note the wide area of discharge which the radial traversing action of the 50 ft. Stacker permits.*



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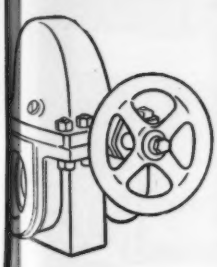

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Gas Mains, Water Mains, Sewers, Drains, etc., cleaned by scraping, dredging, boring, flailing, or chemical methods.

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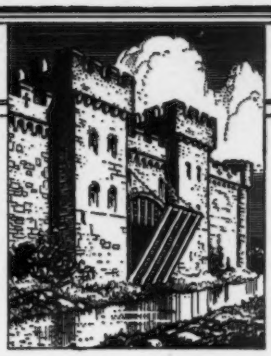

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GAUNTLET

**GAUNTLET**
**WEATHER TESTED PAINTS**

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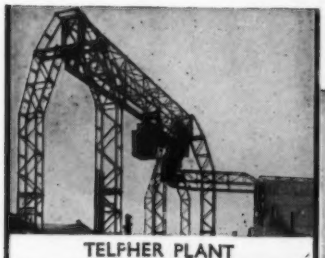
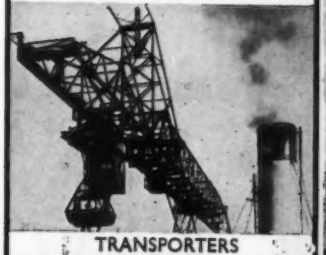
27-37 BARDOWIE STREET POSSILPARK GLASGOW N



TELFHER PLANT



TRANSPORTERS

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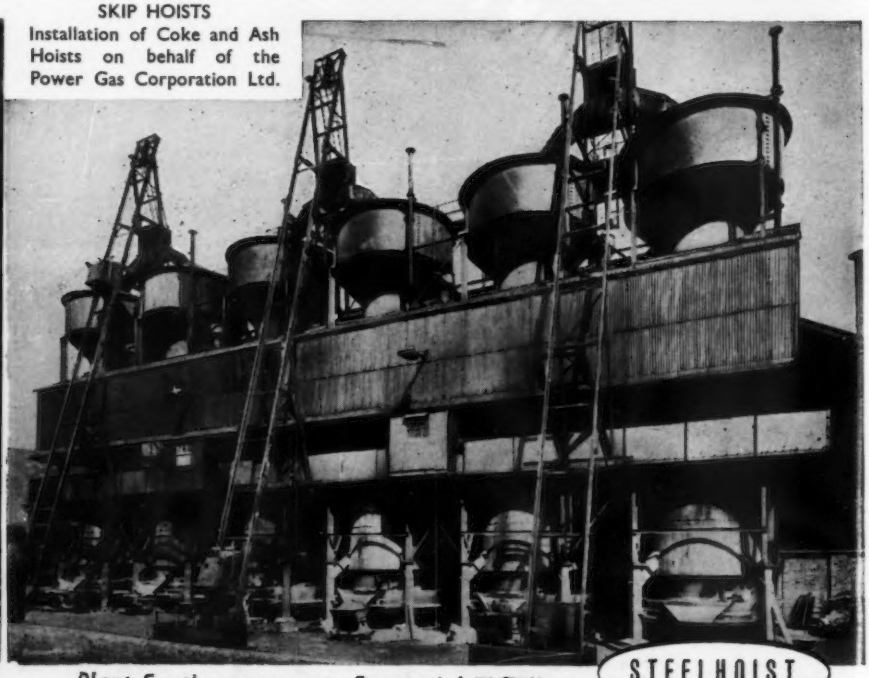
SKIP HOISTS
Installation of Coke and Ash Hoists on behalf of the Power Gas Corporation Ltd.



*Plant for the movement of material in bulk.*

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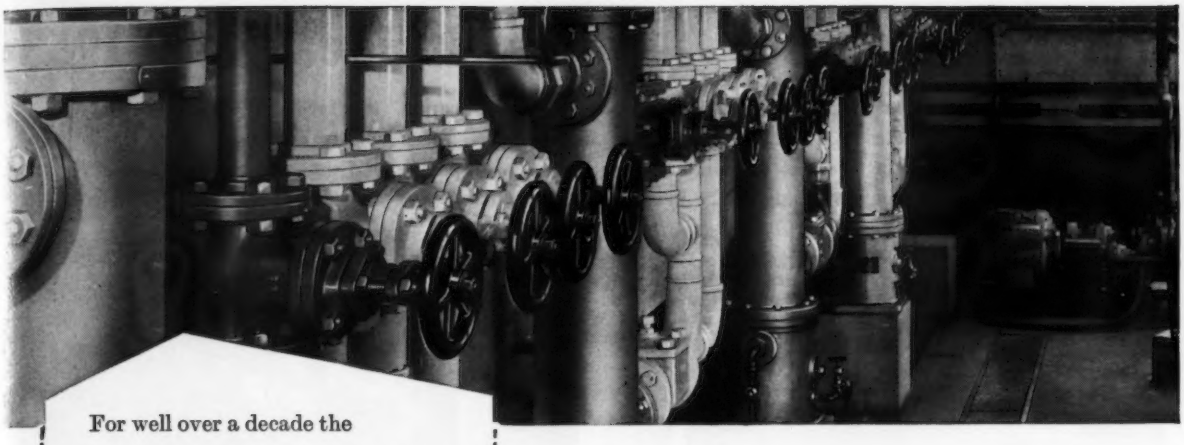
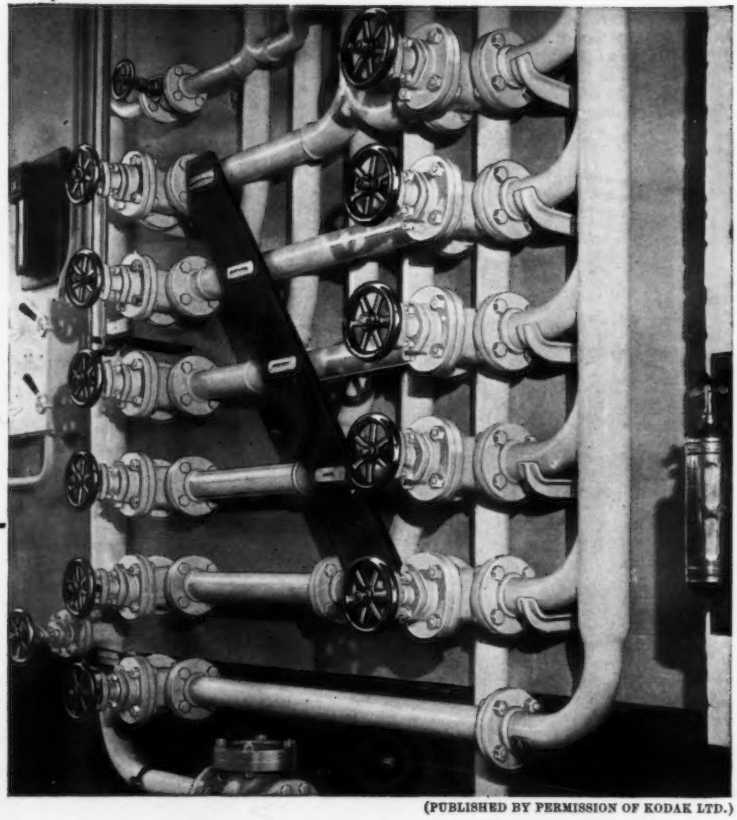
STEELHOIST



For well over a decade the original Crane valves installed in the Harrow factory of Kodak Ltd. have been giving efficient, trouble-free service. Performances like this, in works all over the country, have given Crane its great reputation for absolutely reliable valves. This reputation is based on Crane's high standards of design and manufacture—raw materials chosen to rigid specifications, precision methods of production, exacting tests of finished valves. Manufacturers and engineers, who base their judgment on results, specify Crane for the finest in valves.

# Once again, valves by Crane...



*Visit our London Showrooms at Great West Road, Brentford, Middlesex or* 118, *Wigmore Street, W.*1. *and see the comprehensive range of Crane equipment for yourself.*

*The illustrations show the Crane valves installed in the Main Compressor House of the Kodak Harrow factory.*

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CRANE

**VALVES OF GUN METAL, CAST IRON AND CAST STEEL**

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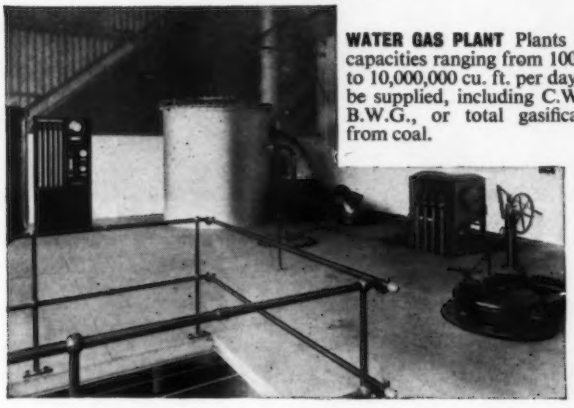
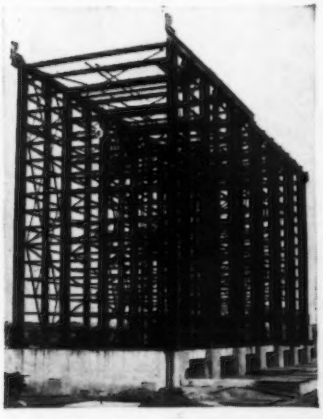


**WATER GAS PLANT** Plants with capacities ranging from 100,000 to 10,000,000 cu. ft. per day can be supplied, including C.W.G., B.W.G., or total gasification from coal.

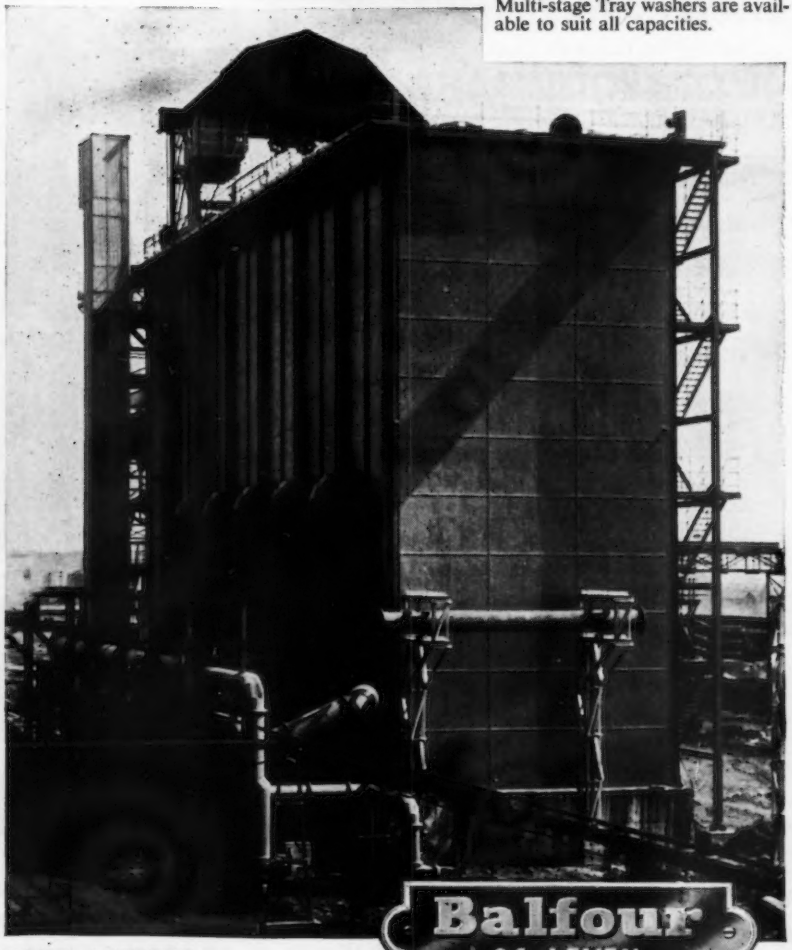
(ABOVE) **WASHERS** Static Washers, Tower scrubbers, Livesey and Multi-stage Tray washers are available to suit all capacities.

**BALFOUR-LECOCQ TOWER BOX PURIFIERS**

(BELOW) An early stage of erection of the plant at the Southall Works of the North Thames Gas Board. Capacity 7,500,000 cubic feet per day. (*Photograph by courtesy of the North Thames Gas Board*).



(RIGHT) The first installation put into operation at the Car House Works, Rotherham at the East Midlands Gas Board. Capacity 10,000,000 cubic feet of gas per day. To be extended to 20,000,000 cubic feet per day. (*Photograph by courtesy of the East Midlands Gas Board*).




**ALSO:** Gasholders (*Spiral or Frame Guided, Rivetted or Welded*). Purifiers (*Cast Iron or Mild Steel*). Condensers (*Vertical Multipass-Horizontal Tubed and Supervertical*). Electro-Detarrers. Complete Gas treatment Streams. By-product Plant etc.

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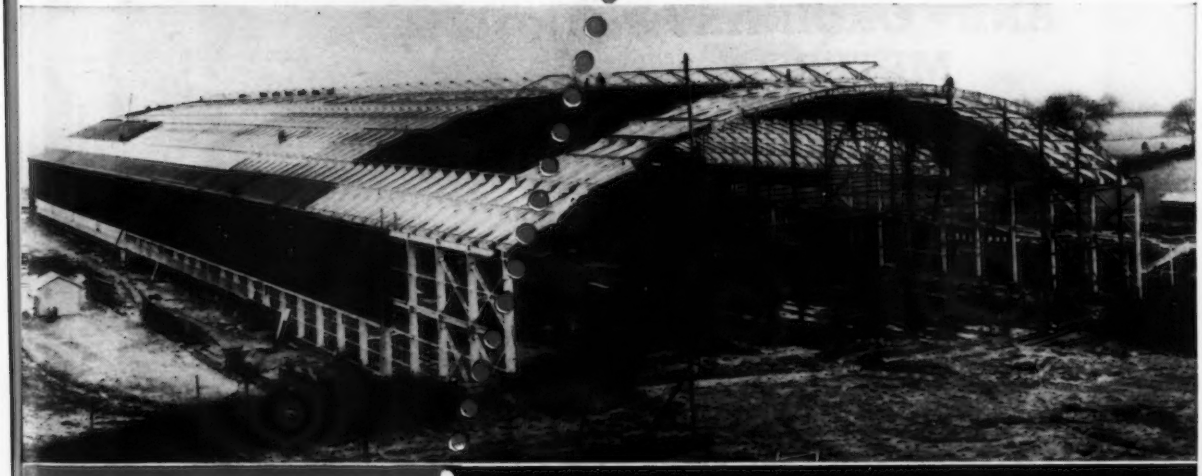
# Reflection and Protection

It's wonderful how ATLAS Aluminium Paints will keep a building bright, cheerful and well-preserved.

Their brilliant, reflective surface provides better lighting, thus reducing eyestrain and the risk of accidents. Used on external surfaces they reflect solar heat, keeping the accommodation beneath relatively cool in hot weather. ATLAS Aluminium Paints give splendid protection against corrosion and prove extremely durable. Send now for descriptive booklet entitled "Coat of Mail Protection."



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*OR CRAMPED LITTLE PLACES*

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*with equal ease*

- Lightweight bench model and portable benders for the plumber.
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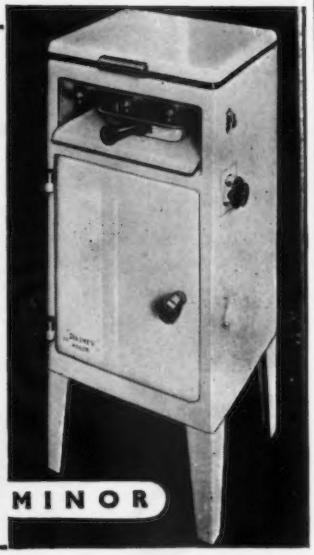
*Approved and adopted by leading gas boards*

The **Dainty** MINOR



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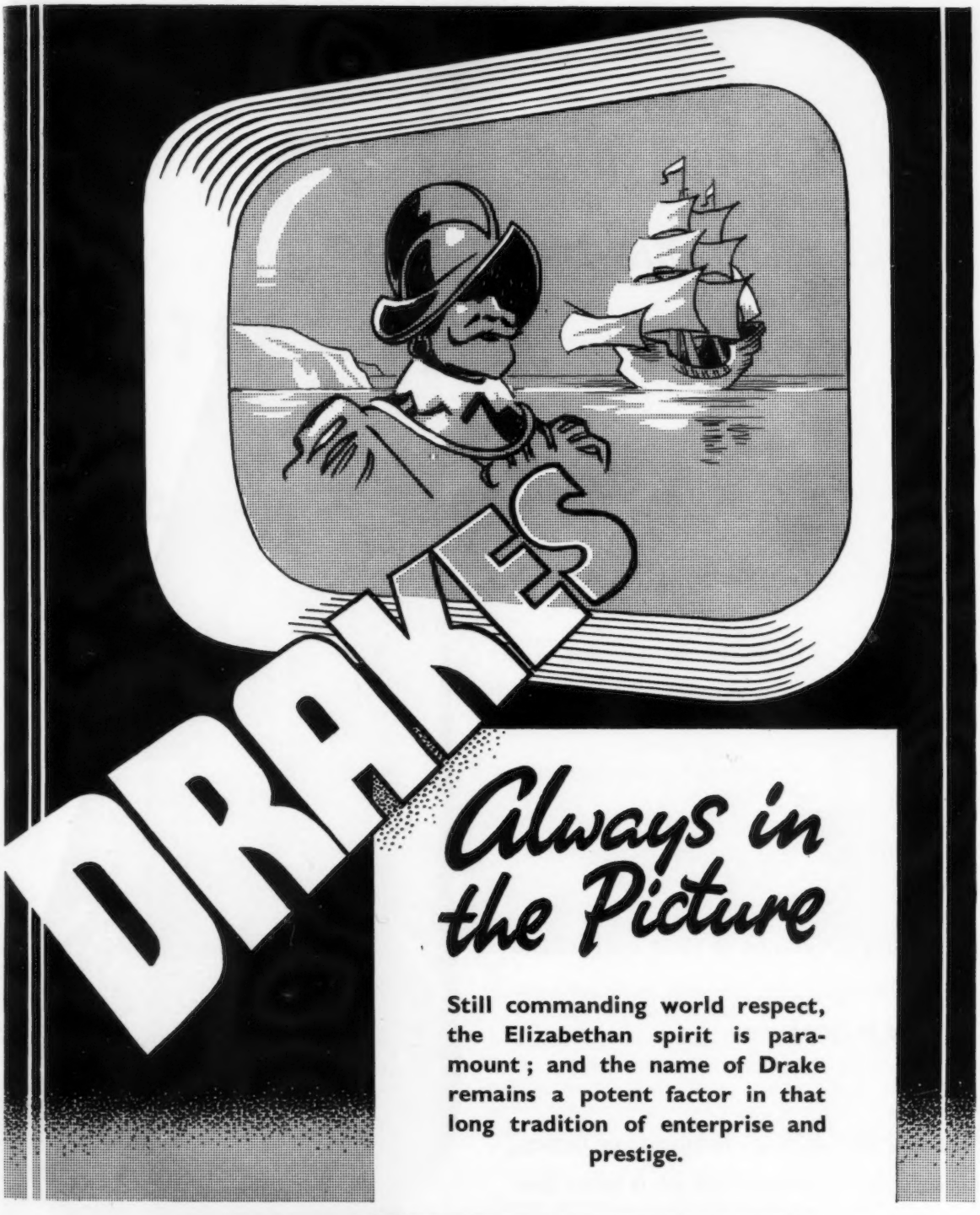
*Repairs—Parts Supplied*

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For domestic gas systems, light gauge copper tubes made by the Metals Division of I.C.I. have five obvious advantages. They are:—

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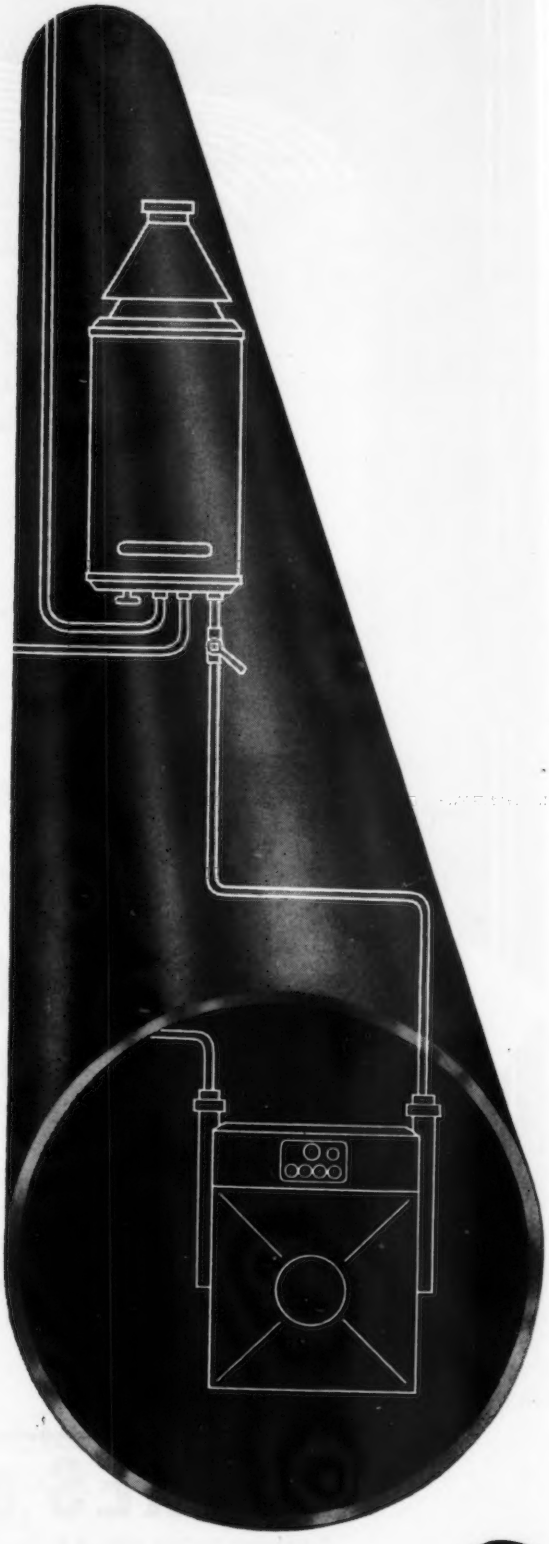

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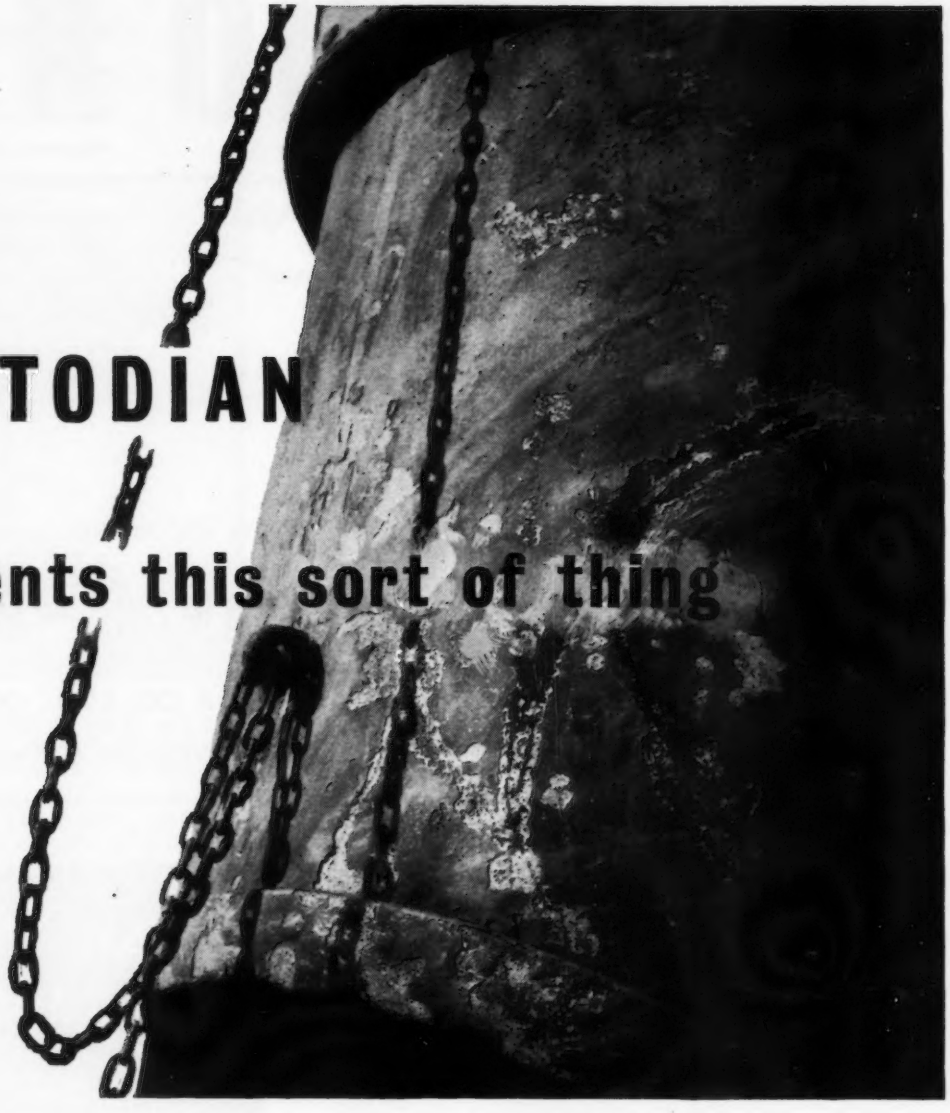

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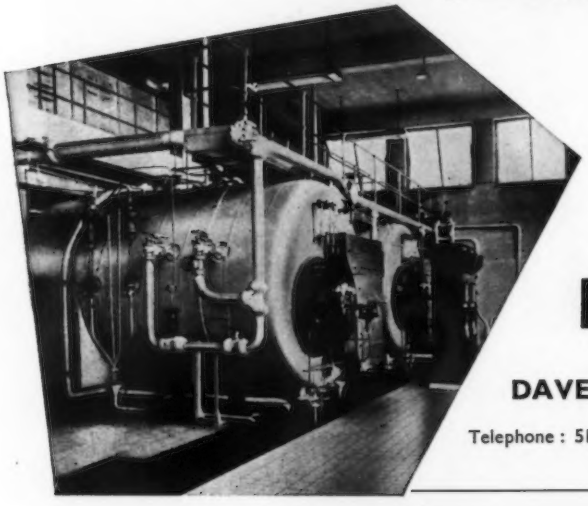

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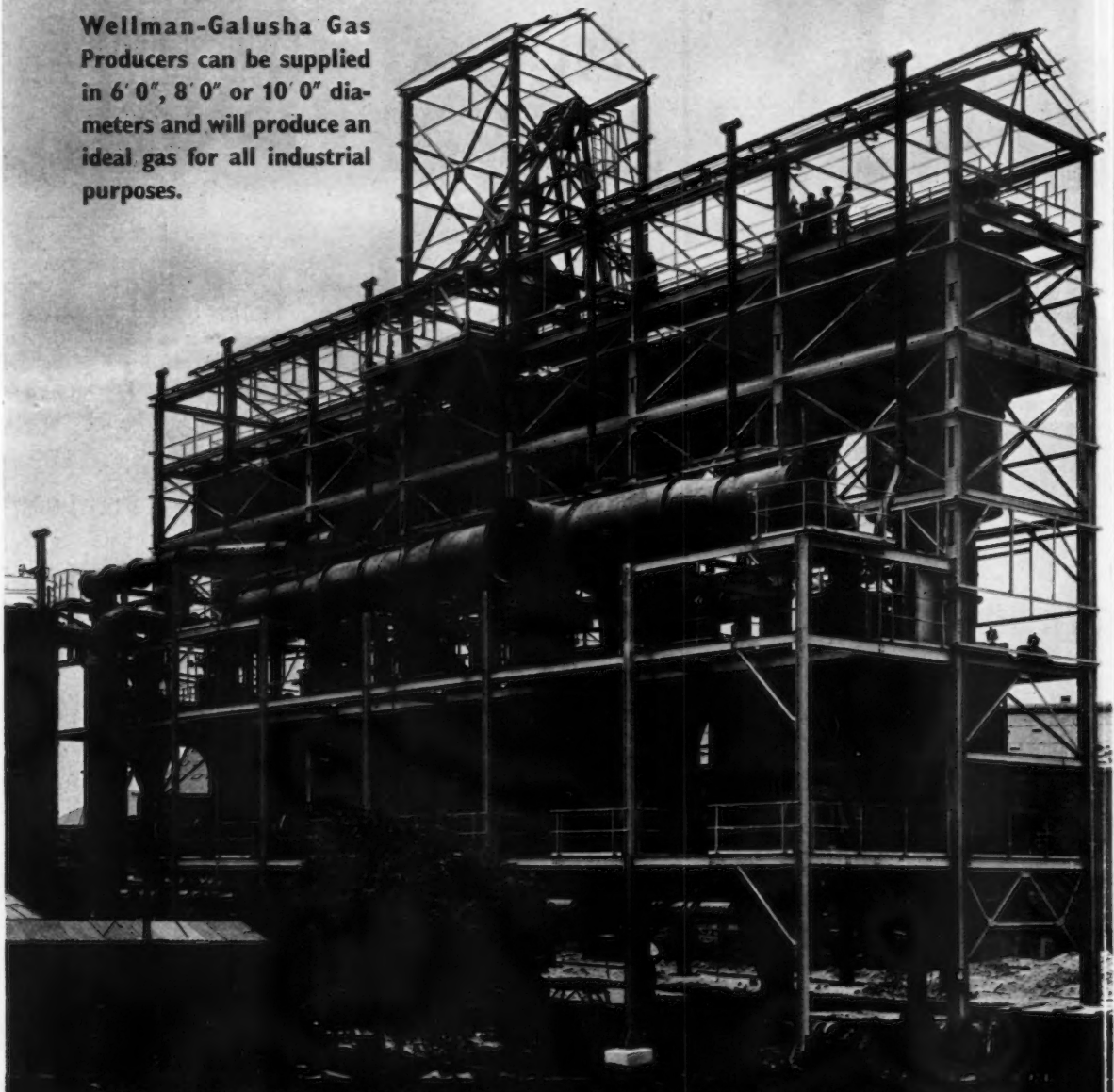

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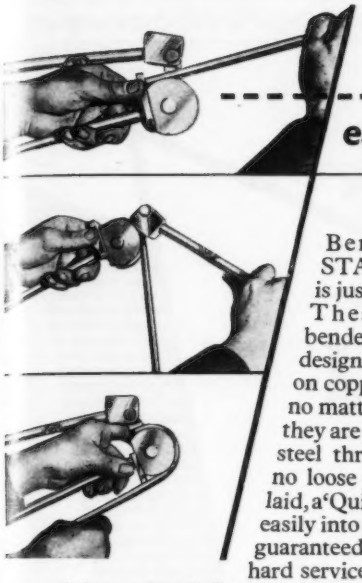

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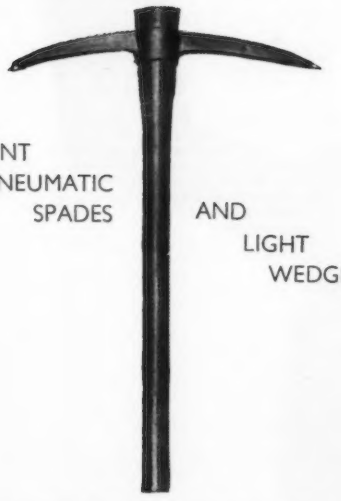

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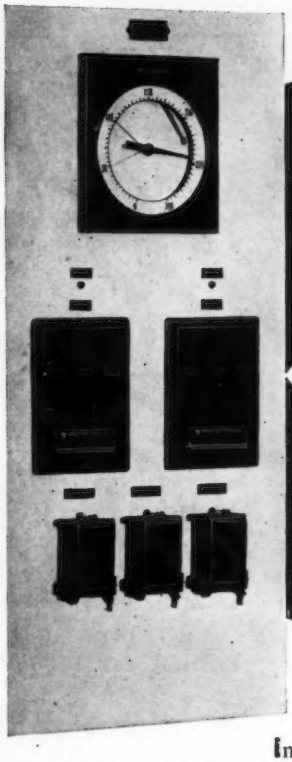

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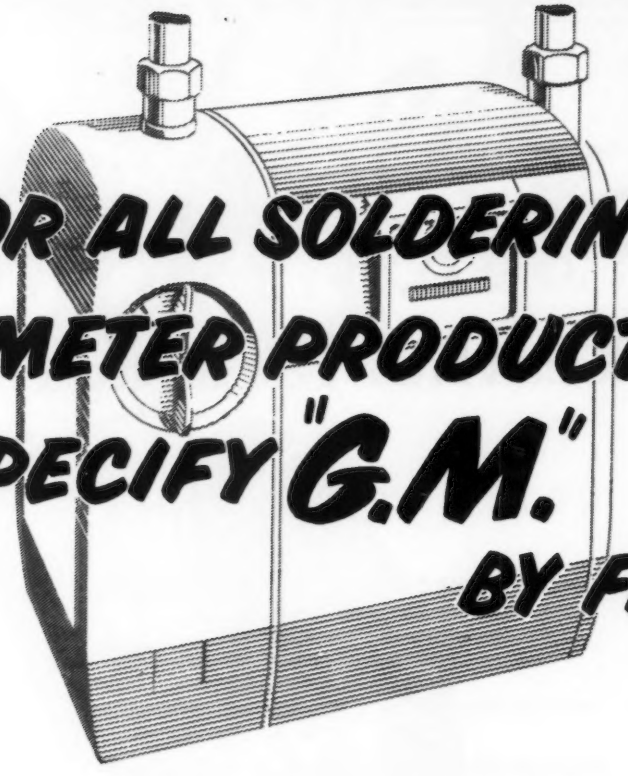

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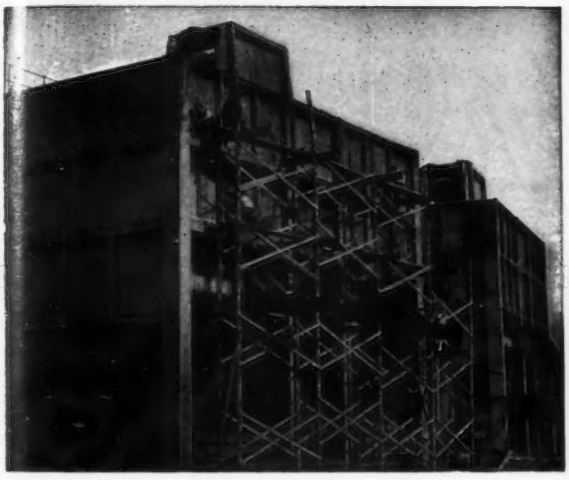

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# Gas Journal

106th YEAR OF PUBLICATION

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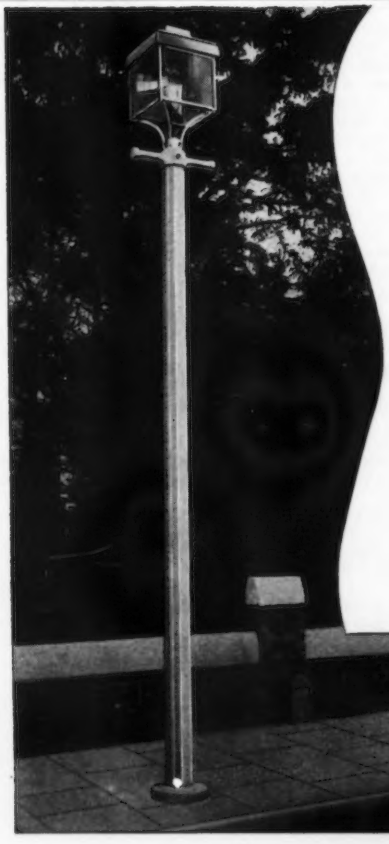

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# Gas Journal

VOL. 277. No. 4736 106TH YEAR March 10, 1954

## A CHALLENGE ANSWERED

By nationalising the gas industry five years ago Parliament placed a not inconsiderable part of the business of producing, distributing, and selling heavy chemicals under public control. In the main, however, the chemical industry still remains in the hands of private enterprise, but the Labour Party is committed, as part of its official programme, to a proposal contained in *Challenge to Britain*, issued early last year, for bringing the industry into the nationalisation field. The threat is directed very largely against Imperial Chemical Industries, the largest single unit in the industry, which has taken the decision seriously and has issued to its stockholders and employees a 30 pp. commentary on that part of the Labour Party programme, analysing some of the arguments advanced in support of nationalisation and pointing out some of the difficulties and dangers involved. Clearly, any drastic change in ownership would have a vital impact on I.C.I., although it is very far from the truth that the Company controls the chemical industry. In terms of labour, I.C.I. employs about one-third of the industry's workers, but it is only one of some 260 firms who are members of the Association of British Chemical Manufacturers.

Lord McGowan, then Chairman, stated categorically at the annual meeting of I.C.I. in 1949 that in the opinion of the Board I.C.I. was not an appropriate subject for nationalisation, and his successor, Mr. John Rogers, reaffirmed the attitude of the Board at the annual meeting last June. The present Chairman, Dr. Alexander Fleck, in a foreword to the document issued last week, states that State ownership of the Company would, in the opinion of the Board, be against the long-term interests of the nation and of I.C.I., its customers, and its employees. Competition demands prompt decisions, but nationalisation would, he says, slow down all major policy decisions. It would stifle commercial and technical initiative and damage the Company's overseas interests, so dependent on the goodwill of other nationals. Good employee relationships could not continue to improve, and the quality of the staff would be difficult to maintain. None of the undoubted advantages that have accrued from the nationalisation of the public services, as represented by gas, electricity, and coal, can be held out as an inducement for placing chemicals under State control; indeed, in almost all the major investigations into the administration of the nationalised industries, I.C.I. has been freely cited as an example of good management.

The document gives a fascinating array of facts about Britain's largest industrial company and declares that there is no sign of a realistic economic plan in the nationalisation programme. On the assertion that chemical production must expand to keep pace with the requirements of other basic industries, the statement comments that between 1945 and 1953 the Company spent over £146 mill. on new capital construction in the United Kingdom, and that the I.C.I. volume of production of chemicals and other products in 1953 was about 80% more than in 1946. In the same period the number of people on the Company's payroll has risen from 92,000 to 106,000—a figure which enables us to visualise quite broadly the relationship in size between this one-third of the chemical industry and the entire nationalised gas industry, which had just under 148,000 people in its employ at the end of last March.

References in *Challenge to Britain* to a tight monopoly and a charge that private individuals and not the community make final decisions in the chemical industry are countered by the comment that the problem of accountability in the nationalised industries has yet to be solved, and that a statutory monopoly is far more protected from sanctions than any private monopoly. I.C.I. manufactures some 4,000 separate products. In some of them it has a monopoly, but this is often more apparent than real. It has a monopoly of 95 to 100% in alkali; this, it is pointed out, is an example of specialisation, arising mainly from the economics of large-scale production, which enables I.C.I. to sell at prices a newcomer to the industry would find wholly unattractive. It has monopolies in several other products, all of which have to meet competition from other materials. An assertion that public ownership could be achieved without disturbing the smooth functioning of the industry is challenged, and doubt is expressed as to whether a State-owned I.C.I. would retain the goodwill of certain Commonwealth countries and the United States.

The I.C.I. statement discusses at some length the complications arising from the fact that part of the chemical industry—that operated by the gas industry—is already nationalised, and proceeds to consider four different possible varieties of public ownership, all complicated by the fact that many of the companies have foreign connections. Capital can only come from current income; and to say that no problem arises in the publicly owned sector of industry is to miss the point that taxation is 'already so severe that neither individuals nor companies have sufficient net income, after tax, out of which to make adequate savings for the requirements of industry.' Still higher taxation to provide further capital for nationalised industries is 'a

frightening prospect.' Left alone, private industry will continue to work out priorities according to demand for its products. To suggest that a Government can arrange export priorities is 'manifestly absurd.' Confidence can be created only if the country's finances are sound (which means lower Government expenditure and lower taxes), if there is freedom from fear of nationalisation, and if adequate incentives for work and saving exist.

Under private enterprise, I.C.I. will continue to be developed on sound lines based on demand rather than theories. So long as I.C.I. and other chemical companies continue to be managed and developed along such lines, then, provided there are conditions in which savings can be made and soundly invested, the choice of priorities can safely be left to those in charge, and the industry will continue to be progressive as well as sound.

## SCIENCE AND COAL

As recorded on a later page, a pleasant ceremony took place at Leeds University on February 25 when Mrs. Hodsman, widow of H. J. Hodsman, who died in 1951 after 40 years of devoted service to the University and the profession of fuel science, was presented by the Livesey Professor, Dr. A. L. Roberts, with a volume containing the signatures of the contributors to a travel bursary founded in the memory of her late husband. On the following day a plaque commemorating Hodsman's outstanding pioneer work, which was carried out so unobtrusively, but which had a great influence on the advance of fuel technology, was placed in the Department of Coal Gas and Fuel Industries at the University.

The ceremony preceded the second Hodsman Memorial Lecture, which was delivered by Dr. D. T. A. Townend, Director General of the British Coal Utilisation Research Association, and former Livesey Professor at Leeds University. The lecture is published in full in our issue today, and it will be studied with great profit and no little pleasure. It was, in fact, a most erudite discourse indicating the extraordinary development in coal science which has taken place during the past half-century and particularly during the past 25 years. Not that the nineteenth century was devoid of examples of research into that complex substance coal; but researches in the field were isolated and had neither the present pressure of urgency behind them nor the considerable organisations which have been set up specifically to unravel its mysteries. Hodsman had the good fortune to study under both both Haber and Le Chatelier.

It was Le Chatelier, in his book *Le Carbone*, who remarked that the endless variety of the practical applications of chemistry, and the equally great variety of conditions on which the success of every industrial operation depends, confront us at every moment, with unexpected facts, without any effort of our own. 'We have,' he wrote, 'only to open our eyes for them to be filled with the ever-new procession of natural phenomena which is thus unfolded before them.' Again, 'the hope of a useful tangible result gives people of the most spineless disposition courage to repeat several times experiments which were failures at first, and to vary conditions under which they are carried out with a persistence of which we should be quite incapable under the spur of mere curiosity or of purely speculative, motives.' There arises, as a result of new knowledge, skills, and techniques in other branches of science and technology, need for further research into questions which have been 'solved.' Hence the need for a wide outlook and the great importance of collaboration between research organisations. It was on the development of this wide outlook and a catholic approach to scientific problems that Hodsman laid great stress in his teaching.

Hodsman's interests were indeed wide, and his own researches covered, *inter alia*, such matters as the thermal properties of refractory materials, the liberation of ammonia in carbonisation, the use of oxygen in gasification processes, the properties of coke in relation to domestic heating, flue gas washing, and lime-tar blends. Work on all these technical aspects continues and very many more scientists are engaged in it than was the case when Hodsman took over his duties at Leeds University. In the Memorial Lecture, Dr. Townend touched upon certain of these lines of research; and in his concluding remarks he said Hodsman's period at Leeds marked an epoch during which the University established a world-wide reputation both for its research achievements in fuel technology and for the outstanding men who were trained there and who afterwards held posts at the highest national level. Today we have to build on the endeavours of such pioneers as Hodsman, original in outlook, original in purpose, and great—if unobtrusive—servants of the community.

## PROSPECTS FOR GAS IN U.S.A.

'There is every reason to believe that 1954 will be a banner year, and the outlook for the industry for several years ahead is most promising.' This is from an article by the President of the American Gas Association, Mr. E. H. Eacker, in the Association's *Monthly*—which, by the way, maintains an extremely high standard of production and must stimulate morale. In 1953 the American gas industry held its position as one of the fastest growing industries in the nation. The industry achieved new records in the number of consumers served, in volume of gas sold, and in revenues from sales. Natural gas transmission lines have spread, bringing gas into new areas and augmenting deliveries in regions already served. And in face of record production, proved recoverable reserves of natural gas continue to rise each year. Natural gas is, in fact, mainly responsible for this tremendous advance; gas undertakings have been adding new consumers at a rate of more than 800,000 a year during the past three years. Consumers, now numbering 27,200,000, have increased by more than 150% since 1940; sales of gas have grown by 235% in the same period; sales in 1953 showed an advance of 8.6% over 1952.

It is pleasant to dally for a moment with statistics such as these, and to contemplate the development involved by the facts that more than 8,000 miles of new pipeline were approved by the Federal Power Commission and that 5,000 miles were actually constructed. It is estimated that the natural gas pipeline network in the United States now totals 394,000 miles, or enough to girdle the world more than 16 times. It is anticipated that over $130 mill. will be

spent on underground storage facilities during the next three years. In the words of the President of the Gas Appliance Manufacturers Association, Mr. S. Coleman, it requires no statistical sleight-of-hand to put the gas industry at the head of the parade of U.S. growth industries.

However, the American gas industry is not being lulled into a state of complacency by the present and potential availability of natural gas. Looking to the distant future the industry has been developing methods of augmenting supplies of natural gas through the manufacture of a gas of high heat content that can be used as a substitute. Reserves of bituminous coals are enormous. Vast fields are located near existing transmission and distribution systems. Research on the production of high B.Th.U. gas from coal is being carried out by several organisations—notably at the laboratories of the American Gas Association and of the Institute of Gas Technology, helped, among others, by the Battelle Memorial Institute, Purdue University, and U.S. Bureau of Mines. No estimate has been advanced or even attempted as to when and where rising costs of producing and transporting natural gas and the reductions of costs of manufacturing gas which may be made possible by improved and new techniques may ultimately cross. But the gas industry will be ready to avail itself of such developments if and when the need arises.

### *NUCLEAR POWER COSTS*

In our Parliamentary Notes this week we refer to the debate on the second reading of the Atomic Energy Bill. Since the debate the Director of the Atomic Energy Research Establishment, Sir John Cockcroft, has addressed the Parliamentary and Scientific Committee on the subject of nuclear power costs. It was, he said, difficult to say how the cost of nuclear power would compare with electricity generated from coal. The best estimates that could be made were that the 'second mark' of the present design of nuclear power stations might mean twice the capital cost of a conventional British Electricity Authority station. On the other hand, the water-moderated type of power unit, built for large power output, should be considerably cheaper. The result would be that the capital costs would be somewhat higher than for conventional power stations, but fuel costs somewhat lower. They ought, therefore, to be able to produce power at a price between the present B.E.A. average generating cost of 0.7d. a unit and 1d. a unit, The Ridley Committee Report and B.E.A. reports had suggested that Britain would be deficient in coal, by about 20 mill. tons a year, by 1965, and power requirements seemed likely to continue to expand well beyond that. In order to do the work of 20 mill. tons of coal, nuclear power stations developing 5,000 megawatts would have to be built. This meant about three years of construction at B.E.A. present levels. We could achieve this, if we wished, between 1965 and 1970.

### *GEOTHERMAL POWER*

Very interesting is the announcement that the New Zealand Goverment is giving priority to the building of the country's first geothermal power station—boring down to tap the earth's natural heat—in the North Island's hot springs region. The Minister of Works, Mr. Goosman, has stated at Wairakei that the geothermal station there will have priority over the last of the hydro-electric schemes on the Waikato River. There is, he said, every indication that this thermal region will become a major source of power supply in the very near future.

### *WORLD'S LONGEST PIPELINE PLANNED*

The Trade Minister of the Canadian Government has announced the merger of Trans-Canada Pipe Lines, Ltd., and Western Pipe Lines to build the longest gas pipeline in the world. This natural gas line will run from Princess, Alberta, to Toronto and Montreal—a distance of 2,240 miles. It is said that the deal is the largest such merger in Canadian history. It is assumed that a start on the project will be made this year, that natural gas will be available in Winnipeg next year, and in Ontario and Montreal by 1956. It is anticipated that the line will be extended to Quebec City and that a branch line will deliver gas to Ottawa. The enterprise will carry the name Trans-Canada; and it is significant of modern trend of thought on gas supply that the Trade Minister, Mr. C. D. Howe, has, according to all reports, taken the view that the laying of an all-Canadian pipeline is as important in today's context as the building of the Canadian Pacific Railway was to Canada 70 or 80 years ago. At present the Trans-Canada Company plans a 30-in. pipe to Toronto. It would drop to 24 in. from Toronto to Montreal and into a branch line dipping into South-Western Ontario. The Alberta Government has indicated that it is quite prepared to release an output of 365 mill. cu.ft. of gas a day. This would keep the Company going for about 22 years; and more gas is expected as Alberta's fields are developed. Considering the heat value of a cubic foot of natural gas, 365 mill. cu.ft. a day represents a huge potential. Great Britain's annual sales amount to about 2,450 mill. therms. We work out that the trans-Canada pipeline alone (taking gas at, say, 1,000 B.Th.U. per cu.ft.) would account for an annual sale of something around 1,350 mill. therms.


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# Personal

DR. H. W. MELVILLE, F.R.S., has been elected a Director of Radiation Ltd.

MR. J. W. RIMINGTON, Chief Accountant of No. 5 Area of the East Midlands Division, has been appointed by the National Coal Board to be Finance Director of the Scottish Division. He succeeds MR. R. W. PARKER, who was recently appointed Deputy Chairman of the North Western Division. Qualified as an accountant, Mr. Rimington is a member of the Association of Certified and Corporate Accountants. In 1922, he joined Shipley Collieries, and worked his way through all commercial departments to the position of Chief Accountant to the Company and its subsidiaries.

MR. JAMES SHAW, Chairman and Managing Director of Allied Ironfounders, is relinquishing his appointment as Managing Director on March 31. MR. W. T. WREN is appointed Managing Director as from that date. MR. W. H. SMITH relinquishes his appointment as Deputy Managing Director, and is appointed Vice-Chairman as from March 31.

# Obituary

MR. HAROLD CLAPHAM, a Director of Clapham Brothers, Ltd., Keighley, died suddenly while on a visit to Keighley in February, aged 66. He was formerly Engineer, Manager, and Secretary of the Redcar Gas Company, and resigned in 1921 shortly after the purchase of the undertaking by the Redcar Corporation.

ALDERMAN FREDERICK J. COWIE, a former Lord Mayor of Bradford, for several years Chairman of the Gas Committee prior to nationalisation, died at his home at Bradford on March 3 aged 70. Within a few years of becoming a member of the City Council in 1926 he was elected Chairman of the Gas Committee, and as an engineer he had the necessary experience for directing the municipal gas undertaking. It was during his chairmanship that a big reconstruction scheme was carried out, and when he left office the reserves of the Department had grown to £200,000.

MR. PERCY G. SOMERVILLE, who retired in 1949 after 30 years as Secretary of the National Benzole Association, died at his home at Wandsworth on March 2, aged 70. From 1903 until 1919 he was Staff Officer of the Gas Light and Coke Company, attached to the personal staff of the late Sir Francis Goodenough. In February, 1919, he was seconded by the late Sir David Milne-Watson, then Governor and Managing Director of the Gas Light and Coke Company, to the National Benzole Association. From 1929 to 1939 Mr. Somerville was also Secretary of the British Delegation of the International Conference of Benzole Producers.

## MEMORIAL TO H. J. HODSMAN

A volume containing the signatures of the contributors to a travel bursary, founded in memory of the late Mr. H. J. Hodsman, was presented to his widow at the second Hodsman Memorial Lecture at Leeds University on February 25. On the following day a plaque commemorating his work was placed in the Department of Coal Gas and Fuel Industries. The wording of the plaque is as follows:—

*Henry James Hodsman*, M.B.E., M.SC., F.R.I.C., *Senior Lecturer in Gas Chemistry. Died in January, 1951, after 40 years of devoted service to the University and the profession of applied chemistry. A pioneer of the fuel sciences and a mainstay of his Department from its early days. He will long be remembered as a scholar, tutor, wise counsellor, and friend.*

Prior to the Memorial Lecture, Professor A. L. Roberts, who occupies the Livesey Chair at the University, announced apologies for absence from the Pro-Chancellor (Sir Hubert Houldsworth) and the Vice-Chancellor (Sir Charles Morris). There had been no difficulty, said Professor Roberts, in deciding how the memorial fund should be applied. Mr. Hodsman had always emphasised the value to his students of overseas travel and of studying foreign industries. In his youth he had spent a considerable time in France and Germany, and was a competent linguist.

Mrs. Hodsman said how proud she felt that the work of her late husband had inspired this most generous act.

The Memorial Lecture, on 'Science and Coal,' was then delivered by Dr. D. T. A. Townend, C.B.E., D.SC., HON.M.INST.GAS E., F.R.I.C., Director General, British Coal Utilisation Research Association, and former Livesey Professor at Leeds University. The lecture was attended by members of the Yorkshire Section of the Society of Chemical Industry and the Leeds University Chemical Engineering Society.

A vote of thanks to Dr. Townend was moved by Mr. T. Penny, Chairman of the Yorkshire Section of the Society of Chemical Industry.

*At the ceremony to mark the establishment of the Hodsman Bursary. Mrs. Hodsman holds the book bearing the signatures of those who subscribed to the Fund. Professor Roberts shows the memorial plaque which subsequently was placed in the Department of Coal Gas and Fuel Industries at Leeds University*

# Diary

**March 11.**—NORTH WALES JUNIORS: Chairman's Day. Visit to Point of Ayr Colliery. Paper by J. Woodcock.

**March 11.**—MIDLAND JUNIORS: Visit to Swan Village Gasworks.

**March 12.**—LONDON JUNIORS: Papers by E. G. Brooks (De La Rue); E. R. H. Rains (Watson House); H. Targett (Catering Section, N.T.G.B.), 178, Edgware Road, W.2. 6.30 p.m.

**March 12.**—MANCHESTER AND DISTRICT SECTION, I.G.E.: 'Accelerated Continuous Carbonisation (Rochdale Process),' T. Nicklin, Production Engineer, and M. Redman, Assistant Production Engineer, North Western Gas Board; Library Theatre, St. Peter's Square, Manchester, 2.30 p.m.; preceded by luncheon, Café Royal, Peter Street, 12.30 for 1 p.m.

**March 15.**—EASTERN G.C.C.: Connaught Rooms, W.C.2. 2 p.m.

**March 16.**—EASTERN JUNIORS: Competition Papers at Lincoln.

**March 16.**—LONDON AND SOUTHERN SECTION, I.G.E.: 'Suiting Our Times, a Commercial Opinion.' G. H. W. Madge, North Thames Gas Board, 17, Grosvenor Crescent, S.W.1. 2.40 p.m.

**March 17.**—SOUTHERN G.C.C.: Special Meeting on Revised Tariff Proposals, Canute Room, Polygon Hotel, Southampton, 11 a.m.

**March 17.**—SOUTH WESTERN SECTION, I.G.E.; Visit to Exeter Gasworks, 11 a.m.; 'Steam and Power Generation at Stapleton Road Works, Bristol,' J. Parker, Rougemont Hotel, Exeter, 2.30 p.m.

**March 20.**—YORKSHIRE JUNIORS: 'Use of Liquefied Petroleum Gases for Town Gas Enrichment,' J. G. Gaunt, Deputy District Engineer and Manager, Spenborough. At Sheffield.

**March 22-26.**—FACTORY EQUIPMENT EXHIBITION.—Horticultural Hall, Westminster. Gas Council Exhibit.

**March 23.**—MIDLAND JUNIORS: 'Integration Problems.' F. L. Atkin. Staff Mess Room, Council House, Birmingham.

**March 24.**—MANCHESTER JUNIORS: Joint Visit with North Western Salesmen's Circle to Stoves, Ltd., Rainhill.

# The Ideal Home in Pictures

*A brief impression of the Ideal Home Exhibition was published in last week's* JOURNAL. *Here now are photographs of some of the outstanding exhibits.*

*On the right is a section of the Gas Council's pavilion with its battery of appliances, while below is a close-up of the 'Happy Home' display which is the key to the gas theme this year.*

*Thomas De La Rue & Co., Ltd., give pride of place to the new 'Warwick' cooker and visitors to the stand can take part in a competition to place its 12 features in order of merit.*

*The Renown Five cooker is displayed to advantage on the stand of the Parkinson Stove Co., Ltd., and demonstrations of cooking a mixed grill for six persons in 25 minutes are given in the Hall of Cookery.*

*The 'Main 32' refrigerator on the R. & A. Main, Ltd., stand has a featured position. Other appliances on show include the Century' cooker, Main water heaters and the well-known B.B.U.—or back boiler unit.*

*Radiation Group Sales, Ltd., show their complete range of cookers, fires and water heaters on a stand of admirable contemporary design. A glass demonstration unit shows a circulator and illustrates the function of the economy valve.*

AN ADMIRABLE PUBLICATION—

# 'THE PROFESSION OF GAS ENGINEERING'

PUBLISHED BY THE INSTITUTION OF GAS ENGINEERS

*This is one of the photographs (reproduced here on a greatly reduced scale) of the many illustrations which add to the attractiveness of the I.G.E. Publication 'The Profession of Gas Engineering'*

Recently in our columns ('JOURNAL' of February 24, p. 466) we commented on the attractive booklet published by the Gas Council entitled *A Career in the Gas Industry*. Since then we have received from the Ministry of Labour and National Service a copy of No. 19 of the *Careers for Men and Women* series. This booklet covers in a rather general way chemical, gas, and mining engineering, oil prospecting and production, and fuel technology. Obtainable from H.M. Stationery Office at 1s. 6d., it describes the qualifications required, the training available, and the opportunities offered in this field

And now we have *The Profession of Gas Engineering*, published by the Institution of Gas Engineers and available from the Institution at 2s. 9d., post free (2s. 4d. each, plus postage, for 50 copies or more). This Institution publication deserves an extremely wide circulation. It tackles the whole matter thoroughly from its many angles, and it is obvious that the utmost care has gone into its preparation. Care alone, however, admirable in itself, is insufficient in the appeal and the success of such a publication; and that is why we welcome so warmly and commend without reservation the imaginative approach which is evident at the turn of every page of *The Profession of Gas Engineering*. That the subject is one of great national importance almost goes without saying. To youth, each major industry is a magnet. The forces exerted by the industrial magnets are diverse in field and varied in power. The 'draw' of the gas industry is not particularly strong. We hope that the latest booklet of the Institution of Gas Engineers will strengthen the attraction of one of our leading national industries—an industry gaining strength yearly—and will prove a useful instrument in the recruitment into its ranks of capable, intelligent, and enthusiastic young men. It certainly should be the purpose of the gas industry to see that the booklet is in the hands of education authorities and of all concerned with education.

Following a short introduction there are eight chapters dealing consecutively with the scope and aims of the gas industry, the manufacture and distribution of gas, the place of the engineer and of the scientist in the industry, technical posts on the commercial side, careers with contracting firms and the makers of gas plant and appliances, technical education in the industry, and finally, with the Institution of Gas Engineers itself as the industry's Chartered Professional Body.

The substance of the booklet is in the main familiar to our readers; it is by no means familiar to the outside world, to sociologists and teachers, and—highly important—to parents. There is no need for us to quote at any length from the text, but we do think that useful purpose will be served by referring in detail to Chapter 7, which brings completely up to date, and within small compass, the technical educational requirements.

### Technical Education

It is pointed out that the first essential condition for those who desire to follow an engineering or a scientific career is that they should hold a recognised certificate of general education in certain basic subjects. The student may then proceed on one of the following courses:—

(a) To take a Degree in Gas Engineering at the University of Leeds.

(b) To take a Degree course in Physical Science or Engineering at any British or Commonwealth University. Graduates in Chemistry and Physics who aim at the higher scientific posts in the gas industry may with advantage take a post-graduate course leading to a higher Degree, to the Fellowship of the Royal Institute of Chemistry, or of the Institute of Physics. Those with an inclination to the practical side of the gas industry may take a special post-graduate course in Gas or Chemical Engineering which is provided at certain centres, or take up a graduate pupilship in the gas industry itself. Graduates in Engineering should certainly take the latter course.

(c) To become a staff pupil of an area gas board or of a firm making gas plant or appliances. This normally comprises a five-year period of training combined with part-time studies leading to the appropriate professional qualification. No premium is required, and the pupil receives remuneration during his training.

(d) To take a post in the drawing-office or laboratory of a gas undertaking, or at the works of a contracting firm making gas plant or gas appliances. The more ambitious student will find it possible to take an external Degree of London University by attending a part-time day or evening course. Others may prefer to take a National Certificate course which should be pursued to the Higher National Certificate in an appropriate subject. Every encouragement is given for such part-time study, either by day or evening classes, and many centres provide facilities for students taking these courses.

The booklet goes on to say that, whether course (a), (b), (c) or (d) is followed, it is important that *at the beginning* the student should consult the Secretary of the Institution of Gas Engineers. This will ensure that the career starts on the right lines and, if pursued with success, will lead to corporate membership of the Institution, which is the recognised professional qualification of the gas engineer.

### Courses in Gas Technology

It is explained that, in addition to the professional courses leading to Associate Membership of the Institution of Gas Engineers, there are courses in Gas Technology (Manufacture) and (Supply) which

*GAS DISTRIBUTION CONTROL CENTRE*

are primarily intended for supervisors. These courses are administered by the City and Guilds of London Institute and involve attendance at a technical college for three evenings a week for three years or its daytime equivalent, and two evenings a week for a fourth year, with studies in ancillary subjects as well as in Gas Technology. The Certificates awarded by the City and Guilds of London Institute, while not entitling the holder to membership of the Institution, are in themselves worth-while qualifications recognised by the gas industry. Further, it is always possible for the more ambitious students to continue their studies by means of National Certificate courses for the Associate Membership examination of the Institution. In this event, the work already undertaken for the City and Guilds Certificate is a useful preliminary and would enable the holder to embark upon a National Certificate course at an appropriate level.

### Salesmanship and Service

For those engaged on the sales side of the gas industry, courses in Gas Salesmanship and Consumer Service have been established at certain centres and a Certificate is awarded by the Institution, on behalf of the Gas Council, to those who successfully complete a training course and examination. The scheme of instruction consists of a three-year course covering Gas Technology (Supply), the Principles and Practice of Salesmanship, with Mathematics, Engineering Science, Machine-drawing, and English as ancillary subjects, requiring attendance in each year on three evenings a week at a technical or commercial college, or an equivalent attendance at part-time or full-time classes. The ancillary subjects are available in almost all technical colleges or institutes. In the Principles and Practice of Salesmanship, the curriculum of the Incorporated Sales Managers' Association has been adopted and is available in many technical and commercial colleges. The standard required in Gas Technology (Supply) is that of the City and Guilds of London Institute in the subject. Although training by means of correspondence courses is generally not recommended, particularly where technical subjects are concerned, it should be possible, where no suitable alternatives are available, to study for this Certificate by means of correspondence courses. Students who obtain the Certificate in Gas Salesmanship and Consumer Service may go forward for the more advanced Associateship of the Incorporated Sales Managers' Association or for Associate Membership of the Institution of Gas Engineers.

### Craft Courses

It is explained that apprentices in the gas industry, whether employed by the area boards or by contracting firms and makers of gas plant and appliances, are encouraged to take systematic courses of training leading to examinations conducted by a Joint Advisory Committee of the City and Guilds of London Institute, the East Midland Educational Union, the Northern Counties Technical Examinations Council, the Union of Educational Institutions, and the Union of Lancashire and Cheshire Institutes, whereby the practical experience is combined with part day or evening tuition at a local technical college.

To quote from *The Profession of Gas Engineering*, 'some youths after entering the gas industry as apprentices develop rapidly in technical understanding and ability and become fired with the ambition to reach senior technical and administrative posts. There is room for all such persons. It is advantageous that anyone possessing such talent should be discovered as early as possible, so that he may follow a course leading to Associate Membership of the Institution of Gas Engineers.'

The ladder of progress through the 'ranks' is by no means neglected in the booklet, which states with good reason that 'it is quite possible for a young man to start his career in the gas industry as a gas fitter and to progress through the various stages to Associate Membership of the Institution and so become a Chartered Gas Engineer. In point of fact the area gas boards and the contracting firms give every encouragement in such cases by granting leave of absence with pay to enable evening studies to be supplemented with day-time study at technical colleges.' They also assist with expenses incurred in travelling, examination fees, and so on.

We have quoted but briefly from the Institution's latest effort in propaganda. It will be gathered from our note that the style of *The Profession of Gas Engineering* is clear, concise, and very much to the point.

*A CHEMICAL LABORATORY AT A GASWORKS*

# Schwank Heater on Test by N.G.B.

The Northern Gas Board is giving the Schwank overhead heater a trial outside the Grainger Street showrooms in Newcastle-upon-Tyne. Our photograph, for which we are indebted to the *Daily Herald*, shows the considerable interest taken by the public.

The Board considers that the running costs of the system are likely to prove low in relation to the potential advantages; consumption being estimated at 30 to 60 cu.ft. per hour per 10 ft. of frontage. The Grainger Street installation covers 70 ft., and is in action from 10 a.m. to 6 p.m. for a cost of 10s. 8d. Capital cost is from £15 to £30 per 10 ft. frontage, but this is expected to be reduced to £10 to £20 before long.

*Free Warmth in Grainger Street.*

To a recent Press conference, Mr. E. Crowther, Chairman of the Board, said that when they had assured themselves that the heaters would continue to burn evenly in rough weather, and provide a comfortable warmth at the footpath level beneath them, the Board would be ready to attend to the enquiries which had already reached them and to develop the use of the system. But the first step with this (as it was with any apparatus which the Board sponsored) must be to make sure, as far as possible, that it would give and continue to give a trouble-free service. Granted this, many uses could be foreseen for the system. Besides enabling shoppers to examine the windows of big stores in comfort, one could expect that theatre and cinema queues would benefit—he estimated that a queue 50 yards long could be kept warm and comfortable for an hour at the cost of one medium priced cinema seat; spectators in the stands of football and other sports grounds need no longer shiver in cold weather; and the job of the point duty policeman might be greatly ameliorated. To what extent a considerable installation would effect a local clearance of fog, only experience would show.

# 'We are the Envy of the World'

## Dr. A. B. Badger Talks of Strikes and Lock-outs

In a recent broadcast talk in Woman's Hour, Dr. A. B. Badger, Industrial Relations Officer of the Gas Council, discussed the question of 'Strikes.' He said that most people must be wondering whether strikes and lock-outs, such as those in the electrical contracting industry, were really necessary and permissible. He defined a strike as 'a stoppage of work by a group of employed persons acting together, in order to compel their employer to grant terms and conditions of employment which that group wants to enjoy.' That was the weapon the trade unions could use.

But the employer could use the weapon of the lock-out. That was to say, he could, because of a trade dispute, close a place of employment, or refuse to continue to employ any number of persons working for him in order to compel those persons to agree to terms and conditions of employment acceptable to him. We saw both methods used in the electrical contracting industry. The Union brought electricians out on strike who were employed on certain sites, and some of the employers in certain cases locked them out when they wished to return to work.

### '*Official*' *Strikes*

The law governing strike action was somewhat confusing and untidy. The Conditions of Employment and National Arbitration Orders of 1940-1950 had been revoked. They were necessary during the war years and immediately afterwards to prevent strikes ruining the war effort. Under these Orders strikes were illegal until the dispute had been reported to the Minister of Labour, and until 21 days had elapsed, and if the Minister had by then failed to refer the dispute to arbitration. The Trade Disputes Act of 1927, which was passed after the shock of the General Strike of 1926, had also been repealed by the Labour Government in 1946.

With these two restricting measures gone, the right of trade unionists to strike, if the strike was in furtherance of a trade dispute, was now legal. There was still, however, on the Statute Book, an Act of 1875 entitled the Conspiracy and Protection of Property Act, which made strikes in gas and water undertakings (and this was extended to electricity undertakings in 1918) illegal and criminal, if there was injury to person, damage to valuable property, or public inconvenience.

### *Unofficial Action*

So much for 'official strikes'—strikes sponsored and supported by the trade union organisations. But what about unofficial strikes? These were strikes where the employees took action on their own. They started a strike without the authority of their union, and such strikes could be, and probably were, more dangerous than official strikes.

The main responsibility for the regulation of wages and conditions of employment in this country lay with the democratic system of joint voluntary negotiating machinery set up by organisations of employers and by the trade unions. This joint machinery—usually called a National Joint Industrial Council—normally negotiated agreements. The two parties made a contract, whereby the employers' federation committed the employers to a certain agreement, and the unions committed their members.

An unofficial strike meant, therefore, that the members of the union were not prepared to honour the agreement concluded on their behalf by the union leaders with the employers. It would, of course, be equally disturbing if the employers were not prepared at any time to honour the agreement made on their behalf by the employers' federation. Apart from the breaking of the contract, what was also serious was that an unofficial strike meant that either the employees had temporarily lost faith in their union leaders or the union had temporarily lost control over its members, either of which was not good for anybody.

But, in the present strike, we saw the opposite action taking place. Some of the members of the union refused to obey the union orders to strike. Why? Either the employee did not agree with the reason given for strike action; or he was afraid of losing earnings or even his job, or for political or national reasons. And no doubt some of the wives told their husbands what *they* thought about it all.

We were more fortunate in the matter of strikes in the eight years following the last war than we were in the eight years following the 1914-18 war, because we had now more experience of voluntary negotiating machinery. After the first world war, for example, there was the general strike of 1926. Sixteen million working days were lost because of strikes and lock-outs, which was probably more than was lost in the 15 years between 1905 and 1919.

### *An Unsolved Argument*

Our losses in trade and wages were tremendous, and the country was heartily sick of it at the end. Some said the strike was illegal, and that every striker was personally liable for damages, because the strike was not a trade dispute, but a conflict between the trade unions, on the one hand, and the Government and the nation on the other; in other words, its purpose was more than terms and conditions of employment and embraced political objects. The unions argued that they were engaged in a sympathetic strike to help the miners in their resistance to reductions of wages, and that, therefore, they were legally entitled to act as they did. That legal argument was never finally solved.

A sense of responsibility to the community and to one another on the part of employers and employees was more important in industrial relations than legal argument. We were the envy of the world because of our widespread and democratic voluntary negotiating machinery. With such machinery and the spirit and skill to operate it properly, strikes and lock-outs should be out-of-date in this country. It might be that in the not too distant future they would be generally abandoned.

## Sales and Service Conference Programme

The Gas Council's final draft of the programme of the Third Annual Sales and Service Conference, to be held at Southport, May 19-20, is as follows:

**Wednesday, March 19**

9.45 a.m.—Delegates assemble at Floral Hall.

10.15 a.m.—Opening session presided over by Colonel Sir Harold Smith, Chairman of the Gas Council. Address by the Earl of Derby, M.C., followed by a welcome to delegates by the Mayor of Southport. Opening address by Colonel Smith.

10.45 a.m.—*Gas Appliances, Development, Production, Salesmanship* session, presided over by Mr. D. P. Welman, Chairman of the North Western Gas Board. 'Design and Development of Modern Gas Appliances,' by Mr. Donald King, Deputy Chairman, Radiation Ltd. 'Technical and Laboratory Service to the District,' Mr. G. C. Holliday, North Thames Gas Board, and Mr. G. H. Fuidge, South Eastern Gas Board. 'The Sales Front,' Mr. A. Entwisle, North Western Gas Board. 'Salesmanship and the Housewife,' Mrs. Hilda Whitlow, Cookery and Homes Editor, *Homes and Gardens*. Discussion.

12.30 a.m.—Adjournment for official inspection of exhibition of gas and coke appliances and buffet lunch.

1.50 p.m.—*Organising a Sales Campaign* session, presided over by Mr. A. R. McBain, C.B., O.B.E., Chairman, Southern Gas Board. 'Why Bother About Sales?' Mr. F. H. Bunn, Hoover, Ltd. 'Marching Orders,' Miss Mary Strong, Northern Gas Board. 'Partnership Unlimited,' Mr. S. L. Pleasance, Ascot Gas Water Heaters, Ltd.

8 p.m.—Civic Reception at the Floral Hall.

**Thursday, May 20**

9.45 a.m.—*Salesman's Viewpoint* session, presided over by Sir Andrew Clow, Chairman, Scottish Gas Board. 'Taking Stock,' Mr. S. A. King, Eastern Gas Board. Open forum, consisting of Mr. S. A. King and six sales representatives.

12 noon.—Presentation of the Gas Council Trophy. 'The Conference in Retrospect,' Mr. C. H. Chester, C.B.E., Chairman, South Western Gas Board.

12.30 p.m.—Buffet lunch; close of conference. There will be opportunity to inspect the exhibition of domestic gas and coke appliances in the marquee adjoining the Floral Hall.

2 p.m.—*Home Service* session, presided over by Mrs. Eileen Murphy, Home Service Adviser, Gas Council. Delegates welcomed by Colonel Sir Harold Smith, followed by 'New Homes, New Problems,' Mr. Stirling Everard, M.B.E., North Thames Gas Board. 'The Importance of Mixing Operations in Baking,' Dr. J. B. M. Coppock, British Baking Industries Research Association.

6.45 p.m.—Dinner to home service delegates, Prince of Wales Hotel, Mr. H. F. H. Jones, M.B.E., Deputy Chairman of the Gas Council, in the chair.

*

# W-D INSTALLATIONS IN AUSTRALASIA

| | Installation | | tons per day |
|---|---|---|---|
| ADELAIDE (Aust.) | 1st | – | 80 |
| | 2nd | – | 100 |
| | 3rd | – | 160 |
| | 4th | – | 75 |
| BRIGHTON (Aust.) | 1st | – | 60 |
| | 2nd | – | 20 |
| | 3rd | – | 28 |
| | 4th | – | 58 |
| | 5th | – | 58 |
| | 6th | – | 58 |
| | 7th | – | 58 |
| CHRISTCHURCH (N.Z.) | | – | 150 |
| FREMANTLE (Aust.) | 1st | – | 20 |
| | 2nd | – | 20 |
| | 3rd | – | 10 |
| | 4th | – | 30 |
| | 5th | – | 30 |
| GEELONG (Aust.) | 1st | – | 60 |
| | 2nd | – | 20 |
| | 3rd | – | 20 |
| | 4th | – | 20 |
| | 5th | – | 40 |
| | 6th | – | 40 |
| IPSWICH (Aust.) | 1st | – | 20 |
| | 2nd | – | 13 |
| LAUNCESTON (Aust.) | 1st | – | 20 |
| | 2nd | – | 10 |
| | 3rd | – | 10 |
| MELBOURNE (Aust.) | 1st | – | 160 |
| | 2nd | – | 160 |
| | 3rd | – | 160 |
| | 4th | – | 160 |
| | 5th | – | 160 |
| | 6th | – | 160 |
| | 7th | – | 160 |
| | 8th | – | 160 |
| | 9th | – | 160 |
| | 10th | – | 160 |
| PERTH (Aust.) | 1st | – | 80 |
| | 2nd | – | 40 |
| | 3rd | – | 165 |
| PORT PIRIE (Aust.) | | – | 22 |
| SYDNEY (Aust.) | 1st | – | 210 |
| | 2nd | – | 210 |
| | 3rd | – | 210 |
| | 4th | – | 210 |
| WANGANUI (N.Z.) | 1st | – | 20 |
| | 2nd | – | 40 |
| WOLLONGONG (Aust.) | 1st | – | 36 |
| | 2nd | – | 12 |

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*The Second Hodsman Memorial Lecture*

# Science and Coal

*This Lecture was delivered by Dr.* **D. T. A. Townend,** *C.B.E., Director-General of the British Coal Utilisation Research Association, and formerly Livesey Professor at the University of Leeds, on February 25, at a meeting of the Society of Chemical Industry Jointly with the University Union Chemical Engineering Society*

Dr. Townend said that it was a real pleasure to him to ive the Second Hodsman Memorial Lecture, for on coming o Leeds in 1938 he owed much to Hodsman's wisdom in echnological education, to his long experience and devotion o the interests of the Department of Coal Gas and Fuel ndustries, and to his unsparing help. Hodsman always eemed to epitomise the spirit of the Civic Universities reated at the turn of the century; centred, as they were, n our great cities and closely in contact with the needs of industrial areas, they had participated in what has been termed the 'renaissance of science.'

Dr. A. C. Monkhouse, in the First Memorial Lecture, had given an outline of Hodsman's education at Leeds University and abroad, as well as his industrial experience before coming back to the University as a Lecturer As an 1851 Exhibitioner, his post-graduate training was unique in that he was privileged to study under both Haber and Le Chatelier, who probably did as much as any other academic men to link science with industry.

Keenly alive to the value of the Faculty of Technology, Hodsman argued that all university training was primarily preparation for industry in its broadest sense, whether in arts, medicine, law, the Church, commerce, or the professions in general. There were those who might believe that an education in the most general scientific principles sufficed for all purposes, but experience in universities such as that at Leeds had shown the falsity of this contention. Industry was not a mere abstraction, and the contemplation of abstract principles failed to stimulate the minds of many. Some students appeared to become alive mentally only when they began technical work and observed the implications of theory in actual practice and when they gained insight into the difficulties which had been overcome in building-up industries, how chance discoveries had altered the whole course and prosperity of industry, and how in more recent times the application of scientific principles had raised the efficiency of industry to high levels.

Few would challenge the place of universities as training grounds for the mind, where, later, post-graduate research should be devoted to search for truth and understanding for their own sake. But the search for truth was no less real if applied not only to free-lance endeavour but also to problems concerned with our economic life. Indeed, it could well have happened that free-lance endeavour—the selection of topics for investigation which essentially pleased the individual—might have led to some degree of selfishness among scientists. And how greatly this could be tempered if scientific work were blended with real heart-burning for service to the community!

Hodsman used to stress how Le Chatelier was forthright in speech and writing about the advantages of the study of natural phenomena and industrial problems awaiting solution. Le Chatelier's book, *Le Carbone,* gave a good picture of his approach, and the following quotation, which Dr. Townend gave in his Brotherton Lecture to the Society of Chemical Industry, bore repetition: 'The beneficial influence which an interest in industrial problems exerts on the progress of pure science can be attributed to two main causes. Firstly, inertia makes it difficult for our minds to accept any new line of thought; our thoughts tend to repeat themselves continually and always run over the same ideas again and again. The endless variety of the practical applications of chemistry, and the equally great variety of conditions on which the success of every industrial operation depends, confront us at every moment with a most varied and quite unexpected set of facts, *without any effort of our own.* We have only to open our eyes for them to be filled with the ever-new procession of natural phenomena which is thus unfolded before them. Secondly, the hope of a useful tangible result gives people of the most spineless disposition courage to repeat several times experiments which were failures at first, and to vary conditions under which they are carried out with a persistence of which we should often be quite incapable under the spur of mere curiosity or of purely speculative motives.'

Dr. Townend then came to the main subject of Hodsman's interests—namely, coal; and having in mind that it was the basis of our national economy, said that it was a distressing reflection that it had almost always been devoid of interest to the free-lance worker. Yet today, quite apart from its national importance, it was pregnant with scientific interest.

The scientific study of coal was a comparatively recent development. The truth was, however, that both chemically and physically coal was a very complex material. By comparison petroleum was composed of hydrocarbons, the chemical nature of which had always been well understood. Only some 20 years ago had we begun to understand the chemical nature of the cellulosic and lignitic components of the vegetable tissues from which coal had been formed in geological times. Even today scientists were still acquiring an understanding of synthetic fibres and plastics and, in turn, of their naturally formed counterparts.

## The Approach of the Chemist

The earliest studies of coal made use of analytical chemistry and probably began soon after Bunsen initiated his famous methods of chemical analysis in the middle of last century. They were directed to practical ends—namely, how to recognise coals and to arrange them in relation to one another. One recalled the efforts of Regnault, the French scientist, and later, of Gruner, the French engineer; and by the end of the last century a scheme had been developed which included most of the principal types of coal from peat to anthracite, and related them according to their chemical analysis and characteristics.

The bituminous coals were those which hitherto had been most easily adaptable to industrial uses. Great Britain, although possessing merely 2% of the world reserves of coal, fortunately had been richly endowed with bituminous coals and, to a much less extent, with some anthracites; but 40% of the world's reserves located widely in other countries consisted in inferior brown coals and lignites. And it needed to be stressed that those countries forced to develop such resources had made outstanding advances in fuel technology, notably in methods of gasification.

C. A. Seyler, now well in his 80's and still actively engaged in Dr. Townend's organisation, had written in 1900 on the ideas then current, as follows: 'Coal is classified commercially in a number of ways, varying with local usage and founded either upon characteristic appearance (as in the case of "cannel," "anthracite," or "splint"); or upon manner of burning and the nature of the coke (as in the case of "free burning," "open burning," or "non-caking"); or upon the nature of the flame as "smokeless," "short," or "long," etc.' All these terms were vague and ill defined and their multiplicity was confusing. Attempts to form a satisfactory classification were still being pursued today, but the simple analytical approach had not led to any complete understanding why certain coals differed so considerably from others, although the differences in their chemical analyses were relatively small.

There had followed attempts to elucidate the structure of coal as a chemical, the complexity of which might be

revealed by the processes of chemical destruction or of fractional solution. Dr. Townend recalled here particularly the work of Wheeler and others on the extraction of coals with solvents, and on the thermal decomposition of coal during its carbonisation. These approaches, while informative, had hitherto been disappointing; even thermal decomposition had not been treated in relation to the predictions of chemical thermodynamics, a subject so highly developed since the 30's in the synthetic liquid fuel industries. Bone and his colleagues had done much to establish the essentially aromatic character of coal by the production of a series of benzene carboxylic acids, following the alkaline permanganate oxidation of coal, a subject since developed by H. C. Howard at the Carnegie Institute of Technology. And H. L. Riley had also made striking contributions, using X-ray methods, providing insight into coal structure.

Considerable information had been accumulated about the way in which oxygen, sulphur, and nitrogen occurred in coal, but much of the experimental evidence was of a type which could be catalogued but not readily understood. The basic carbon structure of the molecule, for example, was still a matter of controversy.

Hodsman was himself closely linked with two of Professor Cobb's researches in related fields, published over 10 years ago. In one, the pyrolysis of pure substances and coals was compared in particular relation to the evolution of gases; in the other, rather similar investigations were carried out with emphasis on the properties of the solid residue. The chemistry of the two processes studied was clearly one and the same, but for the purpose of the present lecture the bearing on the properties of coke was of particular interest. It was shown that the oxygen in the material carbonised, whether cellulose or coal, was of great importance to the internal capillary structure of the carbonisation product, and this conclusion was linked with the evidence for internal burning of such products and with their normally high reactivity. The microcapillary structure reached a maximum at a temperature depending on the material carbonised—*e.g.*, in the range 800°-1,000°C., when the oxygen content was fairly high. Further studies on the effect of alkali activation ascribed them to catalytic effects on the surface reaction rather than to any influence on the microcapillary structure itself.

### The Approach of the Geologist

The second line of approach was that of the geologist and was initiated principally by Marie Stopes about 1919. She drew attention to the presence in coal seams of bands with remarkably differing lustre and hardness. These 'rock types' she named vitrain, clarain, durain, and fusain. Vitrain, glossy black, consisted mainly of ulmin materials from cellular plant structures; durain was dull and hard and formed from mixed plant debris with some ulmins; clarain was a bright coal constituent intermediate between vitrain and durain; fusain was opaque, soft, fibrous similar to charcoal—probably the result of forest fires or of having suffered from spontaneous combustion at some time during its formation. The bands were not, however, homogeneous, and in the 1930's much discussion took place on the idea of 'macerals.' It was suggested that, just as in the rock granite there were several constituent minerals, such as mica, felspar, and quartz, so in the rock coal there were several constituent 'macerals.'

About that time Stach, in Germany, improved the technique of coal microscopy by resorting to the use of oil immersion lenses. He found that these made visible on polished coal surfaces greater detail than was obtainable by the use of etching or thin sections. This observation had come to the notice of Seyler, and, as the outcome of many years of study, he had reported the occurrence of nine different components each with its characteristic reflecting power to light. He had also been able to develop a technique for measuring the different proportions of these present in different samples of coal. The exact scientific interpretation of these observations was not clear, but they had led to some remarkable conclusions on the processes of coal formation, and also of coal carbonisation.

Dr. Townend emphasised that while these petrological advances were of great practical importance in discriminating between coals, they had thrown no direct light on the constitution of the coal substance. One broad conclusion was that the principal component in bright coals, vitrinite, represented from the point of view of the chemist the most characteristic material, and had the greatest claim among all constituents to the name 'pure coal.' Vitrinite was, however, a mixture of chemical compounds and did not contain 'free carbon' in the ordinary sense. The cause of its strong colour was not yet known, but in thin sections most vitrinites were red or orange-yellow, the intensity of the absorption of light leading to the normal black appearance of larger pieces.

### The Approach of the Physical Chemist

The third approach had been that of the physical chemist, and was initiated by the late Dr. D. H. Bangham shortly after he joined the staff of B.C.U.R.A. in 1938. It had already been appreciated that certain features of the behaviour of coals—*e.g.*, their inherent moisture content—suggested a colloidal structure, and that lumps actually consisted of an assembly of small particles, probably too small to be visible under the microscope, but which imparted to the lump a porous structure. Bangham introduced a number of methods involving adsorption of vapours, heat of wetting, etc., which at that time were entirely new in their application to coal. These led to a considerably greater understanding of the colloidal structure of coal and its expression in a simplified model. According to this, the younger coals could be approximately represented by an assembly of very small and nearly spherical units, some 200 A in diameter, packed closely together. Under the influence of pressure and temperature these units became more closely pressed together, their points of contact being flattened and the interstices reduced in size. The availability of the internal surface to gas and liquid molecules thus became less as coals increased in maturity, reaching a minimum value with the strongly caking coals. As the rank of the coal increased still further to the anthracites there was some opening up of the structure, possibly due to the loss of peripheral layers from the colloidal units.

From measurements made by Bangham's methods, it seemed likely that the internal surface area accessible to molecules of the common gases varied from 20 to 200 sq. m. per gramme (from 2 up to 20 acres per lb.), according to the rank of coal. Apart from the consequences of this vast internal surface in relation to the behaviour of coal with oxygen and other gases, it carried with it an important implication regarding its physical strength. If we imagined a cylinder of material of the same density as coal and weighing about 1½ oz., stretched until it had the same ratio of surface to volume as was found in a low-rank coal, we should need to stretch it all the 93 mill. miles to the sun. It would then be very thin and very weak; and a single layer of water molecules on the surface of such a filament would increase its diameter by 5%, and would further weaken it. At once it was seen that this vast surface area in coal made it very vulnerable to simple physical forces and also to chemical reagents, provided they had unrestricted access to the surfaces. It was in this that hope lay of finding entirely new ways of studying and of treating coal, less violent and more controllable than, for example, thermal decomposition.

As already indicated, the accessible internal surface of coals varied considerably with the maturity of rank of a given sample; and while the units of structure, termed 'micelles'—which could have been formed while coal at an early stage of its formation was in solution in swamp water—were moderately closely packed together in the free-burning coals, they were further compressed during the course of maturing to coking coals. At the same time as such physical changes proceeded, chemical cross-linking of the basic chemical components of the micelles might also have taken place with elimination of simple compounds such as water and methane.

To sum up, we had evidence for the existence of a physical unit of coal structure (the micelle), and macromolecules within the micelle; and there was also evidence of a macromolecular unit on a scale about one-tenth of

the micellar diameter. Finally, there was the spacing between nearest neighbour atoms, which were on a still smaller scale. The structure of coal was very 'disordered' compared, for example, with cellulose or proteins, and this made more difficult the determination of its precise character in comparison with that for, say, cellulose. Very approximately, the scale on which the units of structure occurred might be illustrated as follows: Taking a typical spacing between atomic centres as equivalent to 1 in., the diameter of a macromolecule might be comparable to a foot or more according to its shape, of a micelle about 3 yards, and of a grain of coal dust such as blows up in the wind about 5 miles. An ordinary lump such as we put on the fire would on the same scale measure about 5,000 miles across. If we considered the relative sizes of units the contrast was still more striking.

Suppose we took the size comparable with the distance between atomic centres as equivalent to a small drop of water, the macromolecule would then correspond to an egg-cupful, the micelle to a 10-gal. drum, the airborne grain of dust to a large water reservoir, and the lump of coal to the Pacific Ocean. These examples illustrated the point that the macromolecules and micelles were not so very different in size whereas dust particles were on a vastly greater scale.

## Recent Work

In recent years Dr. I. G. C. Dryden, working within the B.C.U.R.A., had taken the subject further through work involving the use of amine and other solvents. Briefly, we now considered the micelle as a unit which, when regarded as indivisible, had proved its value in stimulating fruitful research, but which in fact consisted of a physical aggregate of molecules held together by strong cohesive forces of more than one kind. One could almost say that the Bangham micelle had played a part in coal chemistry similar to that played by the Dalton atom in the wider science of chemistry; and for certain purposes it was still useful to consider it a unit of structure, just as for everyday chemistry the indivisible atom remained a useful concept.

Chemically speaking, the vitrinite of coal was undoubtedly a mixture of more than one constituent, but infra-red spectroscopy, elementary analysis, and general behaviour showed that these constituents had a great deal in common. In this sense it could be said that vitrinites were fairly homogeneous, and we were now convinced that the study of extracts made from coal with solvents at temperatures lower than those inducing thermal decomposition could lead to knowledge which applied broadly to the whole vitrinite. This useful piece of information, which had long been suspected but had only come to the fore during the last few years, now offered hope of a simplified approach to the chemical study of coal. If we could dissolve a part of coal—and no solvent could dissolve the whole of the vitrinite at temperatures which did not cause thermal decomposition—and treat it as representative in type of the whole, we had available an excellent starting material which could be thoroughly mixed before sampling and which contained practically no mineral matter.

The study of the chemical structure of the coal molecule was advancing rapidly at the present time, partly because of the availability of such convenient materials for study, and partly because of the strides made in recent years by infra-red spectroscopy and X-ray diffraction techniques. Further evidence was being obtained from a consideration of the interrelation between physical properties and chemical structure, and by the chemical determination of reactive groups, such as hydroxyl, in the coal. All this was leading to a picture, still rather speculative, which might be described broadly as follows:—

We envisaged in the vitrinite of bituminous coals a small aromatic polycyclic nucleus, containing comparatively few hexagonal carbon rings, the number of which increased gradually with increase in rank; the nucleus was surrounded by short aliphatic side chains and phenolic hydroxyl groups; it was probable that the nucleus also contained quinone structures, and some oxygen was in the form of ether linkages. The low rank coals would have smaller nuclei and larger or more tangled side-chain structures, whereas the reverse would be true of the higher rank coals; the phenolic hydroxyl content fell rapidly as rank increased. These facts could be readily reconciled with the greater tendency of the higher rank bituminous coals to soften on heating, and with the decrease in the volatile matter, produced on carbonisation, as rank increased.

It would seem that the molecules thus broadly described had a phenomenal tendency to stick together and to form large aggregates in solution. The many lines of evidence which suggested that they were probably comparatively flat indicated a reason for this, since if two flat plates stuck together the van der Waal forces preventing them from separating again would be proportionately high relative to the weight of the molecules; and hydrogen bonding between the hydroxyl groups on molecules thus stuck together would also help to resist their dissociation (*e.g.*, by thermal agitation). In solution, these molecules showed a tendency to form large aggregates of two or three quite distinct and preferred sizes. The reason for this was not known, but there seemed little doubt that the large aggregates observed in solution were related to the micelles discussed earlier, the presence of which in the solid state was deduced by Bangham.

It was obvious that investigators were necessary with wide academic training extending beyond that of individual specialisations in order to tackle such problems successfully; and it was unfortunate that in some quarters there was a tendency to look upon those who cultivated such wide outlook as traitors to their own pure discipline. It was possibly because of this that coal as a subject of university research had been very much neglected and was still not favoured, in spite of the many interesting academic problems which were raised by its study. As an example of such problems, reference could again be made to the aggregational behaviour of coal in solution, behaviour which was in many respects reminiscent of that shown by soaps, but which occurred in an even more precise and definite way, and at very much lower concentrations than with soaps. Here was a big field of investigation in pure physical chemistry, the solution of which would undoubtedly enhance our academic knowledge of solutions and colloidal systems in general.

## The Mechanism of Burning

Having devoted some time to discussing the porous character of coal, it was pertinent next to consider its importance in the process of burning. The overall stages of combustion were complex, but could be summarised as follows: (a) Oxidation of the solid, (b) generation therefrom of carbon monoxide and the completion of its combustion to carbon dioxide, and (c) emission of volatile matter.

### *Oxidation of the Solid (Internal Burning)*

It would be clear that oxygen could react at the exposed geometrical surfaces of pieces of coal and also at their internal surfaces bounding minute inner pores. As already shown, the total internal surface was enormously the larger, and recent experiments had disclosed how the internal surface was a determining factor in the rate at which fuels burned, or, to use a technical term, in their 'reactivity.' It was not suggested that internal surface was the only factor. For example, some of the mineral matter present in fuels accelerated the rate of reaction of the fuel not only during combustion but also during gasification in carbon dioxide and steam; indeed, those present would remember the Leeds observations with which Hodsman was so closely associated, that alkalis might be used to 'activate' fuels in combustion and gasification reactions at large. And recently it had been shown that even quite small amounts of metallic elements could enhance the reactivity of solid fuels in a remarkable manner; but the precise mechanism operative was still uncertain.

The fact that the internal surface played a real part in the oxidation process during burning might imply that the pore size in fuel pieces increased during the process; and

measurement of the density of partially consumed pieces had shown this to be the case. Indeed, in favourable circumstances, the external dimensions of a piece of fuel often remained practically unchanged until much of it, say, 70%-80%, was consumed. The extent of this phenomenon differed between fuel and fuel and had a determining effect on the mechanical strength of the partially-consumed material.

The movement of oxygen into the interior of burning fuel pieces had also been demonstrated in another very direct way; a positive pressure amounting to 1 in. W.G. could be observed at the interior of a burning piece of coke. This pressure must result from the passage of oxygen from outside into the interior of the piece followed by release in the interior of the products of combustion.

The most important feature of the chemistry of the oxidation of solid carbonaceous fuels was that carbon monoxide was the only primary product occurring at temperatures above incandescence. The formation of the ultimate product, carbon dioxide, therefore occurred in two stages: (i) Generation of CO at the fuel surface, (ii) further reaction of CO with oxygen in the gas phase yielding $CO_2$. This was a matter of great importance when it was realised that the heat liberated in stage (i) was only two-fifths of that liberated in stage (ii). The burning of solid fuels was, therefore, largely controlled by the rate of burning of carbon monoxide, the primary product, an observation well known to Hodsman in connection with his important work on the reactivity of coke burning in domestic appliances.

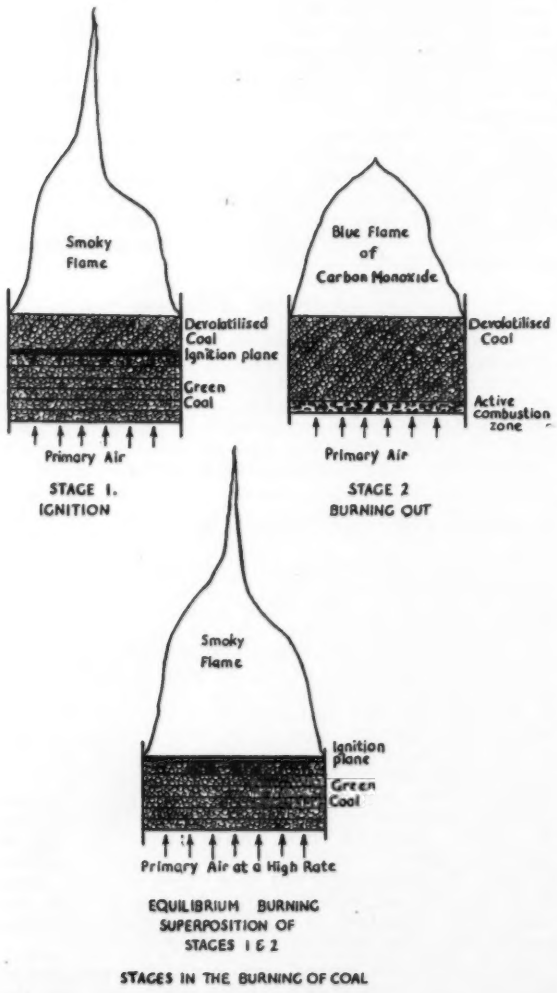


*Fig. 1*

### *The Combustion of Carbon Monoxide*

In common with combustion processes generally, the burning of carbon monoxide depended upon a sequence of chain reactions, involving atoms and free radicals, notably O, H, and OH. Time did not allow elaboration of this theme, but Dr. Townend pointed out one important result: We learned how the combustion of carbon monoxide could be delayed as a solid fuel burned out, for the hydrogen content of the solid then became less and less. In a similar connection Dr. J. R. Arthur had shown in B.C.U.R.A.'s laboratories how the completion of combustion of carbon monoxide, the primary oxidation product, could be completely inhibited in the presence of suitable inhibiting agents—*e.g.*, phosphorus trichloride.

### *The Liberation of Volatile Matter*

Anyone who had sat in front of a coal fire was familiar with the fact that the volatile matter from coal was released at a much greater rate than the solid was burnt. These two stages—the release of the volatiles and the gasification of the solid residue—became distinctly separated in some combustion appliances, as, for example, the travelling grate stoker. The stages are illustrated in Fig. 1. If the rate of air supply under the fuel bed was moderate, then an 'ignition zone' travelled downwards to the foot of the bed (stage 1); this process was accompanied by the liberation of volatiles, the temperature in the zone being merely some 1,000°C. Once the zone had completed its travel, the combustion of incandescent carbon took place at the base of the bed (stage 2) and the temperature then approached 1,500°C. The only source of hydrogen during this second stage was from the moisture present in combustion air, all volatile material containing hydrogen having been previously devolatised. It was possible, therefore, that the partition of the $O_2$ between the C——CO and the CO——$CO_2$ reactions depended critically on whether there was sufficient of the hydrogen containing chain carriers to propagate the CO——$CO_2$ reaction; and in view of the fact previously indicated that the heat release in the CO——$CO_2$ was about $2\frac{1}{2}$ times as great in the C——CO reaction, the exact partition of the oxygen was of major importance.

By suitably increasing the rate of air supply both stages could be made to occur simultaneously at the top of the bed (stage 3). This was known as equilibrium burning and its attainment was of importance in relation to the liberation both of volatiles and also of volatile mineral constituents.

The idea that elementary atoms and molecular fragments, such as those already mentioned in relation to the combustion of carbon monoxide and oxygen, played an important part in flame reactions generally was now widely accepted. For example, the green tinge in flames was due to an emission of light from $C_2$ molecules, the violet colour was due to CH molecules. It had been suggested that soot in flames was attributable to large carbon aggregates formed from $C_2$ units; but light had recently been thrown on the problem by observing the effect of the presence of inert gases—*e.g.*, carbon dioxide and nitrogen—in the combustion gases over burning beds of coal. These gases were components of flue gas, and if the latter were recirculated with the air supply to the fuel bed a reduction in smoke formation was observable. Further, it had been shown that such gases probably exerted their influence by inducing the recombination of hydrogen atoms in flames; and it seemed likely, therefore, that hydrogen atoms also played an important part in smoke formation.

Light had been thrown on this phenomenon by applying observations made by E. C. W. Smith in the Leeds Fuel Department in the early 40's on the production of luminescence by flames in contact with certain activated oxides. The luminescence was produced when flames of hydrogen, or hydrogen-containing combustibles, were allowed to impinge on the oxides concerned; and the luminescence was characteristic of the promoter. Smith showed that the phenomenon was due to the recombination of hydrogen atoms on the promoted surfaces, and more recent work by Dr. Arthur within B.C.U.R.A. had shown that gaseous diluents could suppress this luminescence—by effecting the recombination of hydrogen atoms in the gas.

phase roughly in relation to the target area of the added molecules. Further, at the instant at which the luminescence was quenched, sodium light also disappeared, indicating that hydrogen atoms were no doubt responsible for generation of the sodium atoms which, on excitation, gave rise to the sodium-D emission ($NaX+H \longrightarrow Na+HX$).

Also, when flames were contaminated with sodium salts, there was an expansion of size of the visible envelope of gas; the extent of the expansion depended on the fuel and the mode of combustion. Thus, when simple diffusion flames of the following bases burning in air were examined, the expansion decreased in the order: Hydrogen, methane, ethylene, calor gas, carbon monoxide. From this it was clear that hydrogen atoms escaping from the visible envelopes could be detected by the presence of sodium salts.

These simple experiments were extended to include observations on the mechanism of carbon formation in flames. It was well known that the latter might be suppressed by addition of foreign gases to hydrocarbon flames; and it was noteworthy that the D-line emission was also quenched at a concentration of additive ($CO_2$, for example) at which carbon formation was almost completely inhibited. This suggested that a stage in the process of carbon formation involved reactions of hydrogen atoms. Briefly, a hydrogen atom could strip another such atom from a hydrocarbon molecule, leaving a reactive residue which reacted further with other hydrocarbon molecules forming a larger composite structure. This material was then attacked by another hydrogen atom. These processes, known as dehydrogenation and polymerisation, repeated themselves until the whole of the hydrogen was removed and solid carbon formed.

This simple explanation needed modification, however, as Dr. Arthur had recently shown that, with diffusion or reversed flames, a number of oxygenated intermediates were formed together with hydrocarbons—*e.g.*, $C_2H_4$ and $C_2H_2$. And there could be little doubt, therefore, that oxygenated intermediates comprised some of the materials found in soot.

## HODSMAN'S INTERESTS

As already indicated, Hodsman's interests were wide. His own researches covered, *inter alia*, such fields as: (a) Thermal conduction through refractories and properties of refractories, (b) liberation of ammonia in carbonisation, (c) studies into the use of oxygen in gasification processes, (d) the properties of coke in relation to domestic heating, (e) flue gas washing with ammoniacal liquor and the removal of $SO_2$, and (f) lime-tar blends. Dr. Townend said he would touch upon one or two of these fields.

### *Coke as a Domestic Fuel*

Dr. Monkhouse had made special reference in the First Hodsman Memorial Lecture to Hodsman's work on coke as a domestic fuel; this was quite pioneering in character and established certain general principles concerning the desiderata for coke as a domestic fuel. Its interest was now all the greater in view of the ground just covered in relation to our current scientific understanding of the constitution of coal and its combustion. But it also had special significance at the present time when great national interest was being taken in smoke abatement and the need for a greater availability of smokeless fuels.

### *Coke Formation*

When coal was strongly heated, chemical decomposition occurred and the non-volatile solid was changed into two main products, one consisting of components of low molecular weight and high volatility (the tar, gas, and liquor) and the other a material of high molecular weight approaching the composition of carbon (the coke). Until the chemical constitution of coal was better understood, we were not in a position to specify the reactions that took place or to control or modify them except within small limits. But as a general rule, we could say that the higher the carbonisation temperature, the higher was the density and the lower the reactivity of the coke. These properties could, to some extent, be modified by altering the rate of heating, by preheating or pre-oxidising the coal, and by the selection of petrological constituents before carbonisation. These factors influenced the type of coke largely through their effect on the range of temperature through which the coal was plastic and on the degree of plasticity reached.

Many characteristics of the coal influenced the quality of coke produced, in particular the internal surface and capillary volume; but in order to make a really good coke, it was also necessary that either: (a) Some constituent of the coal was capable of melting or becoming plastic on heating, or (b) the coal produced fluid decomposition products as intermediates before the final hardening to coke took place. It was for these reasons that good cokes could be made only from a narrow range of coals at present.

### *Coke as a Fuel*

The higher the carbonisation temperature at which coke was made, the smaller became the volatile matter left in it, and therefore the more smokeless the coke; but the difference in this respect between low temperature coke (10% V.M.) and gas coke (2%-3% V.M.) was not dominating. High temperature coke exhibited a higher radiant efficiency, which came about in this way: High temperature coke not only yielded less volatile matter than low temperature coke, but it also had a smaller accessible internal surface, and both these characteristics led to a low reactivity; hence, as Hodsman showed, the net heat release in the fuel bed was greater ($CO_2$ rather than CO leaving the bed), the bed temperature was therefore higher, and the radiant efficiency therefore greater. As Monkhouse had pointed out, with the development of convector fires, these factors of carbonisation temperature and reactivity had become less important.

But a coke of low reactivity was not an ideal open fire fuel, because it was slow to light up and slow to recover after re-fueling. We thus saw that while at the peak of combustion rate the high temperature coke might give an excellent radiant efficiency, such periods of peak combustion might form a smaller proportion of the total burning time than with cokes of higher reactivity, and the overall *efficacy* could be less advantageous. Other disadvantages also attended the use of cokes with low reactivity. Operating factors such as bad depth or air control must be kept within narrower limits than was the case with reactive fuels; the bed depth, for example, must be greater, as Hodsman had shown.

In practice a compromise must be effected. Broadly, the minimum reactivity to carbon dioxide compatible with adequate flexibility and ignitibility was needed. Reactivity could be influenced primarily by the nature of the raw coal and carbonisation temperature, and secondarily by activation—for example, with sodium carbonate. Hodsman also stressed the importance of bed depth with a coke fuel, of the reactivity of the fuel, as already discussed, and of the bulk density of the coke. A coke of low bulk density gave a particle and fuel bed surface of much greater effective area than the smoothed envelope of the bed, as well as cavities of higher temperature than the surface average, and consequently a greater amount of radiation per unit geometrical area, at given mean temperature and emissivity. Low bulk density was also important in increasing the ease of ignition; perhaps, Hodsman suggested, because the thermal conductivity was lowered by the cellular structure.

### *Steam Raising*

Hodsman was also a keen exponent of the efficient raising of steam, and wrote a most valuable monograph, *Combustion in the Boiler Furnace*, in connection with his work for the West Riding of Yorkshire Regional Smoke Abatement Committee.

He would have been keenly interested in the fundamental work on the combustion of coal and smoke suppression already reviewed. Indeed, the elucidation of the stages in the combustion of coal in fuel beds had provided valuable information for the design and operation of chain grate stokers. For clearly, if it were possible to control the rate of travel of fuel in relation to the rate of primary air feed, then the combustion bed temperature could be

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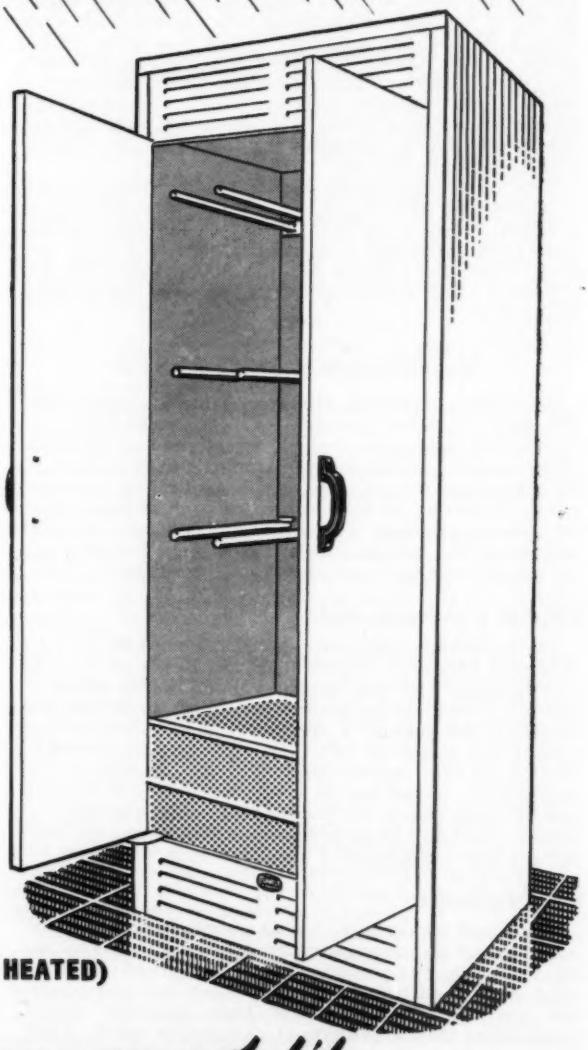

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made to approximate equilibrium burning, thereby lessening the tendency for the release of mineral matter leading to deposit formation. This is illustrated in Fig. 2. Also the use of re-cycled flue gas and steam was another matter now receiving attention because they not only reduced the formation of carbon in secondary flames, but also reduced the swelling tendency of coal and considerably depressed the temperatures normally attained during the burning-out period. Another recent interesting observation in this connection was that pre-treatment of coal with $NO_2$ also reduced the tendency of coal to smoke during combustion and to agglutinate and swell on heating. This was hardly likely to find practical application, but its scientific elucidation might possibly lead to a better understanding of the control of both smoke formation and combustion generally in fuel beds.

The problems of coal utilisation in industry, which, including collieries, absorbed over 60 mill. tons per annum, were mainly related to steam raising. This provided the largest category of coal consumption in the country.

Prior to the war, more or less free choice of grades was available, but at present choice was restricted owing to general shortage. Furthermore, as already indicated, mechanised mining and the working of more difficult seams were tending to produce more small coal. A national need, therefore, had arisen for a scientific appraisal of the influence of various characteristics of coal supplies on boiler performance; and this had been undertaken by the B.C.U.R.A. since 1948. The variables studied involved the influence of rank, size, moisture content, ash content, and coking properties on the overall performance of boilers; the task had now been completed and the results published in so far as the chain grate stoker was concerned.

The results showed that fines, *if dry*, had a serious adverse effect on boiler efficiency and steam output. As much as half the output of the boiler could be lost, and the attainable efficiency—about 75% in the instance of an Economic boiler—could also be halved. On the other hand, if the fines were uniformly wetted so as to contain about 1% moisture per 10% fines through ¼ in. mesh, they had no adverse effect, and the results using the chain-grate stoker compared favourably with those obtained with graded coal. This art of wetting fines had been known for decades; but B.C.U.R.A.'s work had put it on a quantitative basis. Wetting the coal provided more efficient combustion by opening the structure of fuel beds.

The loss of efficiency due to the presence of ash was not more than 0.1% for each 1% of ash in coal; when ash in excess of, say, 17% was present, however, even the addition of moisture did not wholly compensate for loss in efficiency. Also, variations in boiler efficiency due to the rank of coal *per se* did not exceed 5% and were easily outweighed by the other factors.

With suitable mechanical firing, nearly all fuels could, therefore, be burned efficiently. As was well known, the British Electricity Authority was handling a high proportion of the current output of small coal; the B.E.A., in fact, consumed some 36 mill. tons per annum, half on stokers and half as pulverised fuel.

One of the most gratifying developments over the past few years was the installation in industry of small chain-grate stokers in shell boilers. Although these small grates had been generally available only during the past decade, it was estimated that between 2,000-3,000 had recently been installed; and at a guess, there was scope for the installation of perhaps 50,000 such units. Originating from one manufacturer, whose unit had been employed in B.C.U.R.A.'s work, a number of other concerns were now in the field; and the original manufacturer was now directing attention to a still smaller version of stoker suitable for central heating boilers. This development and similar developments were nationally important in that the successful and smokeless burning of coal in central and semi-industrial heating systems could—with the enlightenment of the consumers concerned—release coke for the domestic hearth. In this connection, contributions at the recent annual conference of the National Smoke Abatement Society had drawn attention to the facts that (a) the smoke problem mainly related to congested areas where some 13 mill. tons of coal were consumed for domestic heating

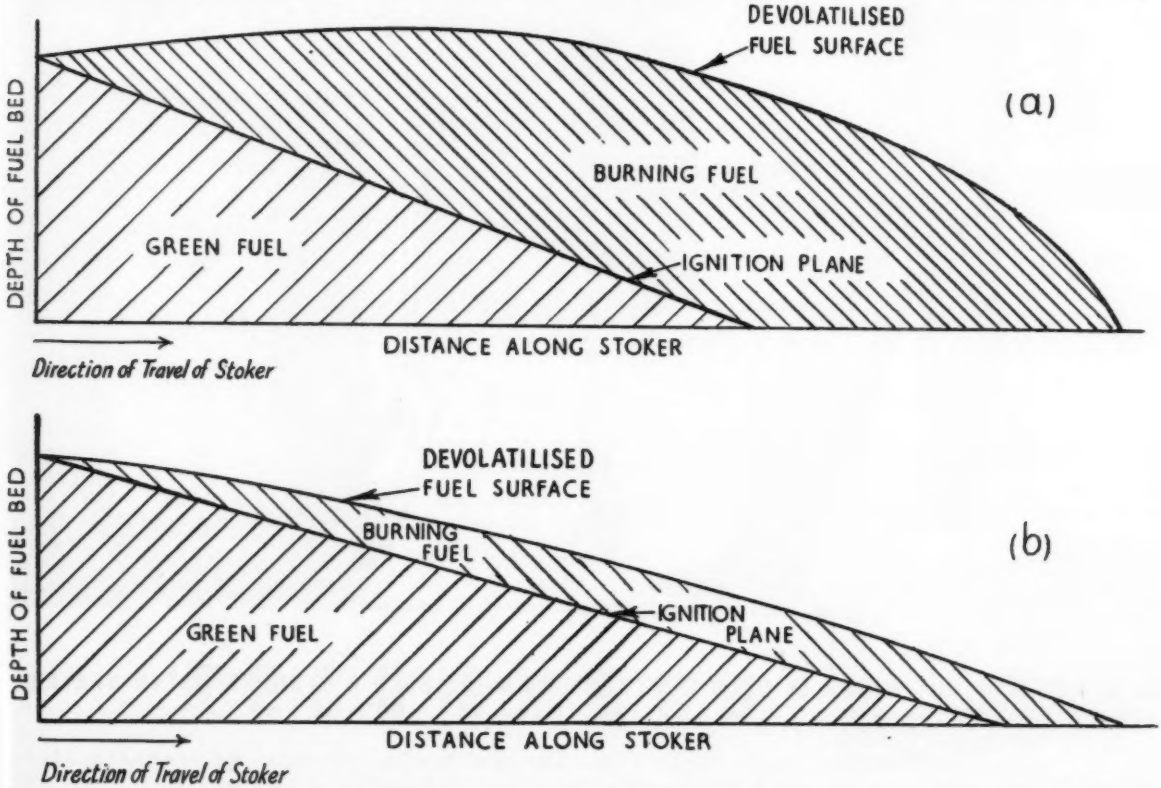


*Fig. 2.—Diagrammatic illustration of a burning fuel bed on a chain-grate stoker at (a) low and medium primary air rates, and (b) high rates.*

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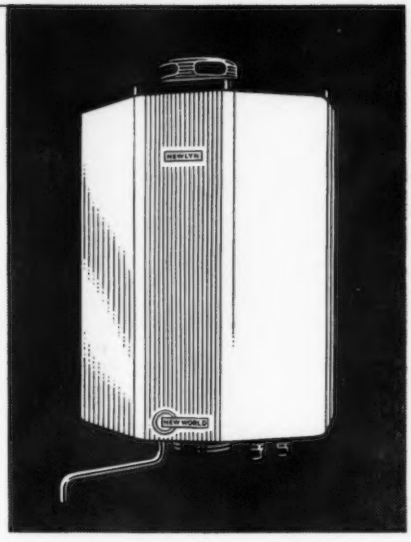

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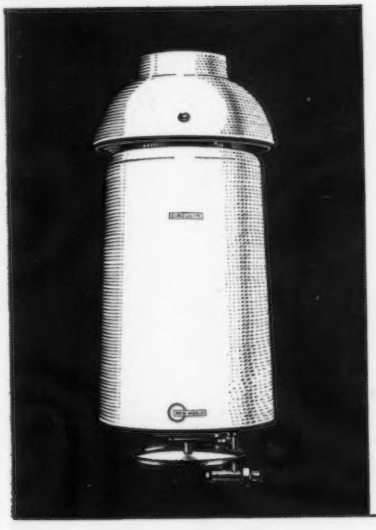

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*Abundant hot water on tap immediately available at the same temperature, winter and summer, with economy strictly controlled by the Regulo . . .* **Maximum Service**

**FOR THE UNDERTAKING**

*Normally no alteration to the meter service, no peak load problem and nothing further to worry about . . .* **Minimum Servicing**

**THE CIRCULYN**

The NEW WORLD Circulyn can be fitted to an existing hot water system as an auxiliary, or as the sole means of supply and gives an abundance of hot water summer and winter to the bath, basin and kitchen sink: it does not dispense with the airing cupboard facilities.

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The NEW WORLD Newlyn Sink Heater, in a normal household working day of 16 hours, gives 75 gallons of hot water at 140°F., at the kitchen sink or hand basin. It holds the same temperature summer and winter; hot from the first drop.

## RECOMMEND

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(replacement of this comparatively small quantity was the vital problem), and (b) that of the 35 mill. tons of smokeless fuel produced annually, only some 5 mill. tons found their way into the domestic market.

### *Water-tube Boilers*

Turning to the field of water-tube boilers, some of the operational difficulties encountered in the past had been due to combustion problems arising from the inorganic constituents of coal. These were mainly concerned with the formation of deposits on superheated tubes and the corrosion of air heaters. These problems became acute during the recent war years owing to the heavy demands on electricity generating plant, and had been studied collectively by the Boiler Availability Committee, composed of representatives of the Water-Tube Boilermakers' Association, the British Electricity Authority, the Fuel Research Station, and B.C.U.R.A.

Attempts at a more complete understanding of the chemical mechanisms operative under the conditions concerned had been pregnant with scientific interest. A high sulphur content of coal affected mainly the corrosion problem; for if the outlet flue gases had a high acid content, their temperature could not be reduced below the dewpoint without risk of corrosion; and a reduction in exit temperature of 30°F. corresponded with a gain in efficiency of 1%. This was a subject in which Hodsman was keenly interested. The alkali content of coal appeared to be mainly responsible for the formation of the difficult deposits; and their accumulation affected both heat transfer and gas flow. They had also been found to depend on the conversion of sulphur to sulphur-trioxide during the combustion process, and on metal surfaces.

As well as wide field investigations, the researches of the Boiler Availability Committee had been mainly devoted to, first, a better understanding of the mechanism of combustion in fuel beds. As already discussed, there were normally two successive stages: Ignition, and burning out; but equilibrium burning, in which the two stages were superimposed, could occur at high air rates. Equilibrium burning proceeded at a lower bed temperature and therefore under less aggravating conditions. Secondly, there were the kinetic processes leading to $SO_3$ formation. Today the problems were less acute because of a better understanding of control of combustion, cleaning methods for the removal of deposits, and palliative methods which could be applied to the combustion process. Pulverised fuel firing was far less prone to the difficulty than the use of stokers, and the B.E.A. planned that, by 1960, 60% of the total coal consumed would be with pulverised fuel plant, meeting most of the anticipated base load requirements.

### *Cyclone Combustion*

A long-distance project offering scope for the utilisation of the increasing output of small coal was concerned with the cyclone combustion system developed in the U.S.A. primarily for the utilisation of Illinois coal. In this system, the coal was not pulverised but was used as fines from $\frac{1}{8}$ in. downwards. As implied in the description, a primary coal/air feed was allowed to swirl within a combustion chamber, the ash fusing on the walls and running away as a slag. The larger particles were not consumed in the gas phase, but burned out following adherence to the 'wet' wall. An experimental system had now been operating for some four or five years at Leatherhead under a D.S.I.R. contract, with the ultimate objective of solid fuel firing for gas turbines. Atmospheric pressure had been employed in the preliminary work, but the system would ultimately be pressurised to 5 atm. The major difficulties of combustion chamber design had been overcome, but for gas turbine operation, gas cleaning still presented a major problem. Here Dr. Townend described the Mordell exhaust-heated gas turbine cycle which avoided direct contact of combustion gases with turbine blades, but necessitated a suitable heat exchanger. Such a system, he said, would avoid blade fouling.

The cyclone system could well find use for steam raising, as in the U.S.A., but there was at present little experience with a wide range of British coals, and there was little doubt that the deposit problem would have to be faced. The system offered the advantages over pulverised fuel firing of avoidance of fine grinding, simple ash disposal, and absence of grit; and combustion efficiency was high.

### A Concluding Tribute

In conclusion Dr. Townend said: 'I have touched on some of the advances in coal science which are now emerging and are so vital to our national economy. In many of the fields covered, Hodsman made definite contributions, but he was keenly interested in them all. His period with Professor Cobb in the Department of Coal Gas and Fuel Industries at Leeds University marked an epoch during which the University established a world-wide reputation both for its research achievements in fuel technology and for the outstanding men who were trained there and who afterwards held posts at the highest national level.

'Perhaps Hodsman's greatest work was through the personal service rendered to the many generations of students who passed through his hands. As Professor A. L. Roberts, the present occupier of the Livesey Chair, has said: "To them, Hoddy was their tutor, director of their studies, and a source of encyclopædic knowledge; much more than this, he was their kindly counsellor and friend, intensely interested in them as individuals, and always ready to extend a helping hand in any direction." In all this, the width of his scientific outlook and his devotion to industry—particularly the gas industry—played a dominant part. Today, we have to build on the endeavours of such pioneers as Hodsman, original in outlook, original in purpose, and great—if unobtrusive—servants of the community.'

# CONVERSION OF GAS TO COKE FIRING

*By J. N. WALKER, Huddersfield-Halifax Group, North Eastern Gas Board.*

The application of a down-jet coke burner to a Series III Ideal gas-fired boiler was the subject of a short paper to the Yorkshire Junior Gas Association on February 27 last by Mr. J. N. Walker, deputy industrial engineer, Huddersfield-Halifax Group, North Eastern Gas Board. The meeting was held at Doncaster.

In the course of his comments the author said:—

To those of my generation who have spent a quarter-of-a-century or more selling gas and gas service, the title of this paper may seem sacrilege. Many of my audience have been concerned in the conversion of solid-fuel fired boilers to gaseous firing. Indeed, the idea of converting a gas-fired boiler to solid-fuel firing would not have occurred had it not been for changes in relative fuel costs.

Since 1939 both coal and labour charges have increased with steady regularity. These increases necessitated corresponding increases in the price of gas. Together with the introduction of rationing, these imposts have compelled users of solid fuel to seek ways of burning it more efficiently. Whereas, in 1939, automatic stokers on central heating boilers were the exception rather than the rule, now hand firing is the exception. Gas-fired boilers, instead of competing with hand-fired boilers working with overall thermal efficiencies of less than 50% and with heavy labour costs, are today competing with automatic coal stokers requiring a minimum of labour, capable of being fully controlled, and running at efficiencies approaching gas-fired boiler practice.

The Huddersfield-Halifax Group of the North Eastern Gas Board lost two major central heating loads to coal stoking and looked like losing a third. That these loads so assiduously sought should be lost to gas was bad enough. That they should be replaced by coal was worse.

## Down-jet Coke Burner

We had gained some little experience of the 'Magnacalor' down-jet coke burner on a low-pressure steam installation, and it seemed possible that the burner could be successfully applied to a boiler designed for gas firing, such as the Ideal Series III. If this proved the case, we should have a considerable advantage over coal stokers in the third installation, which consisted of two 3-GBA-13 Ideal central heating boilers and one 3-GBB-6 for domestic hot water. Conversion to coke necessitated the acquisition of stokers (down-jets). On the other hand, conversion to coal required both stokers and boilers. If we could successfully and economically convert one boiler and use this for base load, with the remaining central heating boiler for early morning peak load remaining on gas, we retain the major business for coke and also some of the gas load.

In the down-jet system the fuel is fed by gravity from a sealed storage hopper and forms an inclined bed at the angle of repose. A jet of air is discharged through the nozzle and impinges on the bed, penetrating it to a depth of several fuel particles. The top layer of the bed acts as an air preheater and little reaction takes place there, the main combustion zone being two or three layers below the surface. As combustion proceeds, the fuel particles are gradually reduced in size and are replaced by fresh fuel which feeds down continuously from the hopper. The larger particles of fuel, which always lie on top of the bed, act as a screen for retaining small fuel and ash particles, so that even when the burning rate is comparatively high, the gases leaving the coke bed contain no unburnt carbon.

Most of the reaction in a down-jet burner takes place in the voids between the fuel particles and immediately above the surface of the bed; and as no secondary air is needed, the combustion chamber volume required is very small and it is possible to proportion the rate of heat release so as to obtain complete combustion with practically no excess air.

The firebed interior remains at a high temperature long after the air has been shut off, so that the heat output can be readily controlled by a thermostat which stops and starts the combustion air fan. When the air supply is restarted, the firebed is fully alight in a very short time.

At a depth of a few particles below the surface of the bed, temperatures well above the melting point of the ash are reached, and the molten ash formed in this region gravitates through the hot coke, without wetting it, until it reaches the zone where the temperature is sufficiently low for it to coalesce and freeze to form a solid clinker. This clinker is easily removed. The combustion chamber is completely water-jacketed, circulation between the jacket and boiler being effected by a small accelerator. Combustion rates are adjustable by a hand-set butterfly valve located in the air line to the nozzle.

## Application to Gas-Fired Boiler

The down-jet burner produces hot gases which can be applied to the combustion chamber of a gas-fired boiler. The problem is to distribute the gases issuing from a circular nozzle over the shallow rectangular gas boiler combustion chamber. The quantity of hot gases from the down-jet at maximum burning rate of 150 lb. of coke per hour was found to be approximately equal to those produced with gas firing—25,000 cu.ft. per hour.

The centre of the down-jet nozzle is approximately in line with the top of the boiler combustion chamber. It was not possible to lift the boiler, nor could the down-jet be lowered, since the boiler house was bitumen-lined and the floor could not be interfered with. It thus became necessary to have an intermediate chamber to absorb the change in levels. At this stage we also considered the intermediate chamber necessary to effect reasonable distribution of hot gases over the boiler base. We are now of opinion that a direct connection is worth trying, suitable refractory baffles being provided under the boiler to effect reasonably even distribution.

A start was made with the conversion during November, 1952, a loose refractory connecting flue between down-jet and boiler being proportioned largely according to gas-burner manifold practice. It occupied the full width of the boiler. As a distributing manifold it failed dismally. No appreciable pressure was built up in the manifold and the gases were for the most part discharged at or near boiler centre. It was also noted that fly ash was being deposited in the boiler.

The second setting was similar to the first but had a baffle wall, one brick thick, interposed between the nozzle and burner parts. This baffle wall had a dual function. It trapped some of the fly ash and assisted distribution of hot gases over the width of the boiler, since these hot gases hit the wall and spread before climbing over to the burner ports. The second connecting flue arrangement was reasonably successful and was operative during December, 1952.

## Problem of Flocculent Ash

At this juncture, fly ash became something of a problem. No jointing material had been used with any of the brickwork and no attempt had been made to seal the hearth brickwork with the boiler base. Most of this section of the system was under pressure, and a light grey deposit became visible around every joint. This flocculent ash also built up on the studded boiler section walls, and at the end of two weeks the back-pressure set up was pronounced.

Following tests, we decided we were being unnecessarily fussy about even distribution over the width of the boiler, and that initial high rates of gas travel through the centre sections would be damped-down by ash build-up, thus spreading the heat transfer to the initially starved outer sections.

During normal weather the down-jet (the installation is in a school) is run between the hours of 7 a.m. and 3.30 p.m. with the gas boiler boosting for the first two-three

(*Continued at foot of p.604*)

# COAL TAR AND ITS PRODUCTS

*Concluded from March 3, p. 541*

A full description of the experimental briquetting plant established by 'Cerchar' (Centre d'Etudes et Recherches des Charbonnages de France) is accompanied by an account of the results obtained from it, in a French paper of which a C.T.R.A. translation is available. This plant of 3 tonnes per hour capacity was set up at the Verneuil laboratories of 'Cerchar' particularly to study the use of molten pitches and bitumens applied as a spray as binders for the production of ovoids. The ovoids prepared from bitumen were tested, hours after making, by measurement of (a) the instantaneous load which produced a 1 mm. wide crack, (b) the flattening produced by the application of a fixed load for a given time, (c) the deformation produced with respect to time by the action of an applied load, (d) cohesion and abrasion resistance, and (e) resilience. The briquettes made from molten pitch were tested for resistance to crushing by the Sahut balance and for cohesion; again these tests were carried out 24 hours after production. Two bitumens (K. and S. softening point 45° and 52°C.) and a coke-oven pitch of K. and S. softening point 72°C. were used with one type of coal.

### Ovoids of Commercial Quality

The results so far indicate that ovoids of commercial quality, as far as strength is concerned, may be obtained by the use of 4.5%-5% of bitumen or 6% of pitch.[37] It should be emphasised, however, that no comparison can be made, on the basis of these preliminary results, of the relative value of pitch and bitumen as briquetting binders, especially for rectangular briquettes which must harden rapidly to allow stacking and transport without deformation almost immediately after pressing. The most interesting point emerging from the work so far is that with pitch as a binder the maximum strength of briquettes was achieved when the mixture contained not more than 2%-3% water.

The known disadvantages of solid pitch as a binder for the production of compressed fuel from coal fines are emphasised in an article by Brossard and Chapins, who advocate the use of a liquid binder and discuss the changes in the quality of briquettes made with petroleum pitch when the amount and characteristics of the binder are altered. For the most efficient use of the binding agent in the production of briquettes it would appear necessary to ensure that the coal particles are thoroughly wetted by the binder before compression, and from this point of view the use of the binder in molten form may be advantageous.[38] The efficient wetting of the coal can be accomplished also, it is claimed, by using the pitch as an emulsion and blowing it on to the hot coal in the form of a foam.[39]

The use of low-temperature tar modified by the Hodsman process—*i.e.*, the addition of slaked lime, for the briquetting of non-caking Indian coal, has been referred to (cf. *Review*, **IV**, Part 1, p. 40). Among further details of this process, both in the laboratory and on a semi-industrial scale, it is reported that mechanically strong briquettes are obtained by briquetting a mixture of 100 parts Tandur coal, 10-15 parts tar, and 0.75-1.25 parts slaked lime at 2,000 lb. per sq. in. These briquettes when carbonised at 600°C. for one hour give strong carbonised briquettes and a high yield of tar.[40]

### Liquid Fuels and Lubricants

Marketing difficulties and the low price of tar have led to the burning of tar for heating the retorts at some Scandinavian gasworks. Experience with tar as a fuel at Tönsberg, Norway, is described,[41] and from Denmark it is reported that the Aalborg gasworks has now been equipped with plant enabling tar to be used as a fuel.[42]

The use of tar for heating steel furnaces is reviewed by Tixier, mainly on the basis of recently published articles describing experiments carried out in Germany. The preparation of the tar before atomisation is important, and variations in both the water content and the viscosity must be allowed for. Reference is made to a series of tests lasting 75 days in which tar was supplied to the furnace at high pressure in a stream of gas.[43]

A number of French patents claiming the production of lubricating oils and greases from tar and its distillate fractions have been noted. In one of these, mixtures of tar light oils with rosin or rosin pitch andfillers are specified;[44] in another a saponified mixture of anthracene oil and a fatty acid;[45] and, according to a third, resins, terpenes or anthracene oils are converted to lubricating oils by treating below 200°C. with a chloride of Group II, III, or IV elements.[46] It is further claimed that anthracene oil can be converted to a lubricant by thermally polymerising at 300°-400°C. for about 20 hours, mixing with alcohol, and cooling to −10° to +15°C., and removing crystalline matter by centrifuging, and the alcohol by distillation.[47] Shale oils, lignites, tars, bitumens, and asphalts can be converted to high-viscosity lubricating oils by aromatisation over a catalyst which consists of a mixture of $NH_4MoO_4$ (20 parts), $CuSO_4$ (6 parts), $Cr_2(CO_4)_3$ (6 parts), $H_2SO_4$-activated earth (32 parts), $(NH_4)_2SO_4$ (20 parts), $TiO_2$ (6 parts), and plastic clay (10 parts). This mixture is extruded or pelletted and reduced with hydrogen at 500°C. and 400 atmospheres.[48]

Tetrahydronaphthalene condensed with formaldehyde in presence of sulphuric acid at 75°-85°C. yields a resin which, after washing to remove excess acid, is steamed to produce a stable emulsion useful as a lubricant. Methanol is added to prevent gelling.[49] Products useful as lubricants can, it is claimed, also be made from chloronaphthalene upon polymerisation by air-blowing while hot.[50]

### Plastics and Resins

The use of mixed catalysts, containing boron trifluoride, hydrofluoric and fluorboric acid (prepared by heating a mixture of sulphuric acid, calcium fluoride and boric acid), for the polymerisation of the styrene, indene, and coumarone in benzole fractions, has been covered in a British patent to Houillères du Bassin du Nord et du Pas-de-Calais. The process is suitable for the treatment of fractions boiling below 150° or 160°C. which, it is claimed, have been little used hitherto in resin manufacture, owing to the formation of oily diphenylmethane derivatives on treatment with the normal (sulphuric acid) type of catalyst. The xylene fractions resulting from treatment of those lower boiling cuts with the mixed catalyst are declared to be of very high quality and to possess a high market value.[51] The preparation and uses of coumarone resins from solvent naphthas of boiling range 150°-200°, and originating from bituminous tars, have been reviewed by Anders. The resins, which can be modified with linseed oil, are used mainly in the manufacture of paints and lacquers and in emulsions for the sizing of paper and as components of cellulose ester plastics.[52]

The two A.C.S. papers by Zettlemoyer and Pieski on the molecular weight distribution in and the viscosities of

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'*CONVERSION etc.*'—(*concluded from p. 603*)

hours. During extremely cold weather, the compensator is run on night compensation out of school hours, with down-jet set at ¼. Water temperatures in the down-jet water jacket and in the down-jet boiler are controlled by separate thermostats operating on the fan motor. The water jacket to boiler accelerator runs continuously from Monday morning to Friday afternoon.

The down-jet is bulky when compared with the orthodox underfeed coal stoker. On the other hand the gas-fired boiler is compact and is a most efficient heat exchanger. Ideal Boilers and Radiators, Ltd., have agreed to supply Series III boilers, without burners, controls, and front plate, for application where a down-jet burner is to be included. The cost of the stripped gas-fired boiler compares very closely with an orthodox sectional boiler of equivalent capacity.

coumarone-indene resins (cf. *Review*, **III**, Part I, p. 38) have now appeared in full.[53]

A composition containing coumarone-indene resin (10-25%), asphalt mineral rubber (50-80%, rosin (2-10%) and paraffin wax (4-7%) is said to be useful as a paper-coating composition, giving flexible and vapour-proof materials which withstand prolonged exposure to weather. Copper naphthenate may be added as a fungicide, and it is claimed that the composition is superior to the asphalt material hitherto used. The latter is stated to give papers less impermeable to water and which crack on creasing.[54]

Another resin which may be used for the waterproofing of paper is made by heating 1-naphthol with formalin at 210°C. for one hour.[55]

According to a patent to C. D. Patents, Ltd., useful resins are prepared by co-polymerising acenaphthylene, styrene and a drying oil in a common solvent. The resinous product has good heat-resisting properties and is suitable for incorporation in paints and varnishes.[56]

The polymerisation of vinyl quinoline, vinyl acridine, and vinyl pyridine is accomplished by treatment with benzoyl peroxide and starch solution at 50°C. The Kodak patent states that polyvinyl pyridine is soluble in dilute acetic acid and in alcoholic solution may be used for coating photographic material.[57]

Following earlier news on *iso*phthalic acid production in America (cf. *Review*, **IV**, Part 1, p. 42 and Part 2, p. 38), it is now reported that the Hercules Powder Co. has started production of dimethyl *iso*phthalate on a 200,000 lb. per month pilot-plant scale. The process involves oxidation of xylene, which need not be highly refined, and the price is declared to be competitive with that of phthalic anhydride. The ester is expected to find use in the manufacture of plastics, plasticisers, and resins.[58] High boiling oils derived from coal tar, preferably boiling above 200°, are specified as plasticisers for polyvinyl chloride. For this purpose, these oils offer certain advantages over the more expensive plasticisers such as organic phosphates, phthalates and succinates, and chlorinated diphenyl.[59]

According to a patent to the Standard Oil Development Co., aromatic hydrocarbons such as benzene, toluene, xylene and naphthalene may be copolymerised with diolefins—*e.g.*, butadiene, at below 0°C., using Friedel-Crafts catalysts, to give hard amber resins. These may be used as surface coatings, in printing inks, rust preventatives and rubber plasticisers.[60]

### Pesticides

The development of the use of coal tar oils as wood preservatives is reviewed and the comparative lives of beech, oak, pine, and larch when creosoted and when untreated are shown graphically. Numerous instances are described in which creosote-treated wood has been in service for 40 or 50 years, and there is an illustration of a cross-section of a creosoted telegraph pole showing no deterioration by fungi or insects after 86 years service.[61]

In another German source it is reported that creosoted timber is being used in many places in Canada instead of concrete—for example, in the construction of bridges and drainage conduits. These structures are expected to have a minimum life of 50 years.[62]

The full papers given at the 1952 Convention of the American Wood Preservers' Association, a brief account of the Proceedings of which was earlier noted (cf. *Review*, **IV**, Part 1, p. 43) have become available during the period under review. They include an account of the evaluation of wood preservatives over the past 25 years by Lumsden, in which are summarised the results of test-plot exposure tests of poles, posts, saplings, and stakes. Creosote and pentachlorophenol dissolved in petroleum oils proved the most effective oil preservatives and a mixture of copper, chromium, and arsenic compounds ('Greensalt') was the most effective water-borne agent. Proper impregnation with creosote to ensure a good retention, penetration, and distribution is more important than variations in the nature of the creosote.[63]

It is stated by Richards, in a report of preliminary results of tests in which treated and untreated panels were exposed to marine organisms in 1948, that untreated panels and those treated with straight petroleum oils were completely destroyed. The severity of the attack on the panels treated with creosotes and creosote-coal tar solutions varied, being greatest in those treated with vertical retort tar creosote and least in those preserved with creosote-coal tar solutions.[64]

The effect of temperature over the range 5°-70°C. on the efficiency of froth flotation of British fine coals, using a 2:1 mixture of creosote and cresylic acid as the flotation agent, has been studied by Bailey and Whelan. The best results were obtained at 25°-30°C.[65] The efficiency of cresylic acids in this application is stated to decrease with an increase in their distillation range; with any given acid the frothability does not alter at *p*H values between 3.4 and 7, increases gradually from 7.5 to 10, falls sharply at *p*H 11 and finally increases at and beyond *p*H 11.5.[66]


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## Acid Dew-Point Temperatures

Investigations by analytical methods into the determination of acid dew-point temperatures in relation to the corrosion of boiler, economiser and air heater surfaces were described by J. R. Rylands and J. R. Jenkinson (E. Green & Sons, Ltd.) in a paper presented on March 4 to the Institute of Fuel. Water dew-point temperature, they stated, was unaffected by the presence of sulphuric acid; acid dew-point they defined as the temperature at which the combustion gases became saturated with sulphuric acid when cooled without change of pressure. The difference between the two lines of approach—condensation and saturation—was important.

After considering examples of unreliability of results obtained by methods of determining acid dew-point that were based on electrical conductivity, the authors demonstrated the existence of two distinct dew-points—that of the acid and that of water in the gases. They had found the temperature range corresponding to the maximum rate of acid condensation to be far more important than the actual acid dew-point temperature, which varied only slightly with wide variations of $SO_3$ content in combustion gases. The temperature range of acid deposition lay generally between 220° and 280°F., outside of which sulphuric acid appeared to remain largely in the gas stream. Best results were obtained by the introduction of super-cooled surfaces into the gas stream slightly before the dew-point position. The mist thus produced lowered the degree of supersaturation, at which the main deposition of acid took place, and thus allowed the combustion gas to pass harmlessly out of the plant. This took place to some extent in boilers which had cooled surfaces in a hot stream, and investigations were needed that would give this result by design.

Serious corrosion could also occur due to hydrochloric acid in combustion gases and at temperatures below water dew-point. The view was expressed that corrosion and deposits proceeded rather by chemical action due to acid catalytically formed than by condensed acid alone.

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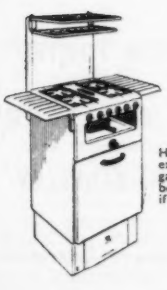

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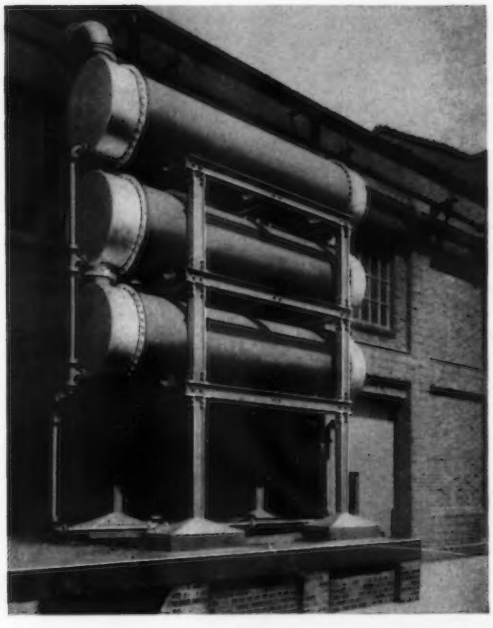

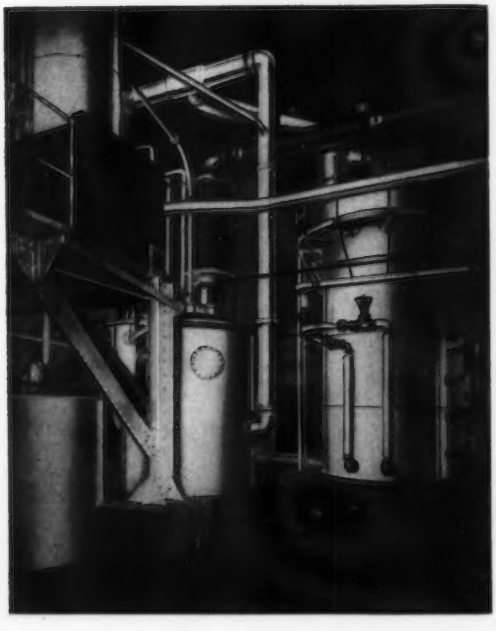

To the growing list of Roystons Grade 1 Sulphate of Ammonia Plants in operation can now be added the second installation at Leeside Works, Tottenham. **This is the only Plant in the country with a steam consumption of 16 per cent. total.**

Special features of the installation include :
**Pre-heaters in stainless steel** resulting in a higher pre-heat temperature.

**Ammonia Still is tile-lined** (*the first of its kind in the country*). There are no cleaning doors to cause leaks or allow heat loss through emission.

**Above.** View of Roystons stainless steel Pre-heaters at Leeside Works, Tottenham.

**Below.** General interior view of Roystons Sulphate of Ammonia Plant at Leeside Works, Tottenham.

Roystons

**GEORGE ROYSTON & SON LIMITED**

**CHEMICAL ENGINEERS & LEADBURNERS**

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# Gas Consultative Councils

SCOTTISH

## Further New Projects Approved

During December and January the Scottish Gas Board approved projects amounting to £2,313,487. Of this sum, £2,047,590 was for the Glasgow Division alone. These figures were reported at a meeting of the Scottish Gas Consultative Council at Edinburgh on February 24, when the divisional totals were quoted as follows: Edinburgh, £6,483; Central, £16,852 (Fife group, £11,004; Dundee group, £5,848); Northern, £2,000; Glasgow, £2,098,878 (Glasgow district, £2,047,590; Dumbarton and Helensburgh districts, £11,088; Kirkintilloch district, £1,200; Kilsyth district, £7,000; Vale of Leven district, £32,000); South-West, £189,274 (Greenock district, £41,692; Irvine district, £12,705; Paisley district, £134,877).

### Provan Developments

It was explained that the bulk of the Glasgow figure was in connection with the proposed development at Provan gasworks and chemical works. At the gasworks major operations will not, it is anticipated, be started for a year or two yet. The first stage of the development, which is expected to be undertaken in 1956-57, is the provision of exhausters, wet and dry purification plant, foundations, connections, etc., at an estimated cost of £208,000. The reconstruction of half the existing retort house and the provision of ancillary plant is scheduled for 1958-59 and is expected to cost £1,670,000. It was pointed out that the 24 mill. cu.ft. purifier installation might be restricted meantime to 12 mill. cu.ft., dependent on the condition of the old purifiers, which recently had been patched and might therefore have a few years longer life. It is intended during this year to replace a steam locomotive which has been in continuous operation since 1903; this will cost £6,528.

At the Provan chemical works the provision this year of two additional road tanks will cost £5,000. Another big Glasgow scheme, scheduled for 1955-56, concerns the Tradeston gasworks. The provision of an all-welded Class 1 Lloyds wet back economic boiler fired by Oldbury chain grate stokers would, it was estimated, cost £40,555, with an additional £28,000 for consequential projects for foundations, boiler house, fuel handling plant, etc. The estimate was given that the savings over the existing plant, including capital repayment over ten years, would be in the region of £7,000 to £9,000 a year, dependent on the load factor. Glasgow mainlaying proposals to service housing schemes at Drumchapel, Castlemilk, and Cadder Road are estimated to cost a total of £72,671.

### Dumbarton and Helensburgh

An £11,088 scheme for the Dumbarton and Helensburgh districts concerns the laying of 2,640 yds. of 12-in. diameter high pressure main. It was explained that in 1947 the Dumbarton-Helensburgh link-up was planned, utilising an 8-in. diameter H.P. main which had been laid in 1938 from the west end of Dumbarton to Cardross. Since then 90% of the housing programme undertaken by Dumbarton Town Council had been in the area between Dumbarton and Cardross, and it had been found necessary to supply the houses from this 8-in. main previously supplying only the village of Cardross. The new housing schemes lie to the west side of the River Leven which divides the town of Dumbarton and there were at present only two mains crossing the only bridge, causing a bottleneck which could be overcome only by providing a new main to assist the west end of the town.

Extensions to ancillary plant in the Vale of Leven district, which will allow carbonising plant to work to full capacity, will, it is estimated, cost £32,000. The extensions, it was explained, include:—P. and A. extractor of 1 mill. cu.ft. capacity to be replaced by an electro-detarrer of 2 mill. cu.ft. capacity; static washer of 1 mill. cu.ft. capacity to be duplicated, giving a capacity of 2 mill. cu.ft.; condensers to be augmented by the installation of a 2 mill. cu.ft. set and the existing condensers of 1 mill. cu.ft. to be retained with the object of economising in water and reducing operating costs; purifiers of four boxes 20 ft. by 20 ft. by 5 ft. to be converted into two boxes 40 ft. by 20 ft. by 5 ft. and two additional boxes, each 35 ft. by 25 ft. by 6 ft., to be supplied and erected, the complete installation to be capable of handling 2 mill. cu.ft. per day; station meter of Connersville type to be replaced by a larger capacity meter of similar pattern.

Other major projects which were reported to the Council were: Additional expenditure on new carbonising plant in Greenock district, £36,000; transfer of purifiers available at Perth and their installation at Paisley, £110,000; additional ancillary plant in Irvine district, £12,705.

### Bent Coins

Councillor S. Leitch presided over the meeting of the Council in the absence of Mr. A. T. Morrison, the chairman, and extended a welcome to a new member, Provost J. Walker, Airdrie. He also, in the name of the Council, congratulated Provost T. Bell, Dumfries, on the O.B.E. recently conferred upon him.

Councillor Leitch said that in Glasgow they had been greatly perturbed about the number of instances of the use of bent coins in slot meters. One of their jobs was to reduce as far as possible any unnecessary expense in the operation of the industry. The use of coins that stuck in the meters caused the industry considerable inconvenience and expense, and it was felt that something should be done to relieve the industry in that connection. Some measure of publicity might be considered.

It was decided that enquiries should be instituted in the various districts to ascertain the general position.

NORTH THAMES

## Electricity Board Demands a 'Guarantee'

A Farnham Common, Bucks., building company has made a representation to the North Thames G.C.C. complaining of a condition imposed by the Southern Electricity Board. The matter was discussed at a meeting of the Consultative Council on February 25. The company, in a letter to the Council, said the Electricity Board was demanding a guarantee of £1,608 12s. per annum for five years. This was a condition for running an electric main to supply 148 non-council houses which the company was about to erect on the Mount Farm Estate, Farnham Common.

The North Thames Gas Board had already offered to lay a gas main and services at no cost to the builder and to install internal gas pipes in the houses at a nominal charge. The building company felt, however, that in view of its liability arising from the Southern Electricity Board's demand, it was unable to incur the additional expense of 'carcassing' the houses for gas. The attention of the Gas Consultative Council had been called to this case, as it was felt that the action of the Electricity Board amounted to 'a denial of freedom of choice.'

A further sum of £470, for the electricity service lines into the houses, was also expected from the company by the Electricity Board.

A letter from the Minister of Fuel and Power, in reply to a letter from the Consultative Council asking him to investigate and submit his views, was read at the meeting. It said that under the Electricity Lighting (Clauses) Act, 1899, electricity boards were empowered to request a capital contribution or guaranteed revenue or a combination of both methods towards the cost of making supplies available. The particular method offered and the terms charged at particular sites were not matters within the Minister's direct responsibility, but were questions to be resolved by negotiation between the consumer or the developer and the electricity board concerned. 'In cases of dispute on the terms charged,' the letter continued, 'the statutory procedure is for the consumer to refer the matter to the appropriate electricity consultative council. The complaint about the condition required by the Southern Electricity Board, that the guaranteed revenue should commence from the date of the first connection, was also a question for the electricity consultative council to consider.'

### Discussion at National Level

Councillor E. Bayliss, Chairman of the Council, said: 'In spite of the strictly legal position as set out in the Ministry's letter, it would appear that this Council's recommendations have not been without effect in bringing about discussion at national level. It is hoped that as a result of publicity in this and other cases in other parts of the country, the Minister will contrive to adopt terms of supply less onerous to estate developers, and which will ensure a proper freedom of choice for consumers.' The latest information about Mount Farm Estate was that the matter was still being negotiated.

A member of the Council commented on a letter received from the Board giving details of the authorised dealers scheme in the North Thames area. He noted that the letter referred to 'the

comparatively few cases where appliances sold by dealers are considered by the Board as unsuitable, in which case consumers are invited to make a further choice.'

Surely, said the member, steps could be taken to eliminate such appliances.

Mr. Elliott, Secretary, thought what the Board meant was that when a consumer went to a dealer and selected an appliance, the dealer was not aware of the conditions where the appliance was to be fixed. It was quite likely that, because of a lack of technical knowledge, the appliance was unsuitable for the conditions in which it was used. It was not a question of sub-standard appliances.

**SOUTH WESTERN**

# Uniformity in Installation Charges

The South Western Gas Consultative Council is to recommend the South Western Gas Board to consider waiving the present installation charge of £5 per house. If, however, a charge is retained the Council recommends that it shall be uniformly imposed. By 19 votes to two, the Council reached this decision at its meeting at Taunton on March 3. It was pointed out that the £5 charge is reduced by 25s. for each gas appliance up to four purchased from and installed by the Board. The Council was told by Mrs. Newbery, who opened the discussion, that Mr. C. H. Chester (Chairman of the Board) had suggested 'flexibility' in the installation charge, according to local circumstances.

The Chairman (Mr. A. W. Loveys) replied that there was no secrecy between local authorities and a reduction in any area would cause dissatisfaction elsewhere.

Mrs. B. J. Shell said that sales of gas and appliances were being lost through the installation charge. If one local authority could 'get away with it,' others must be treated exactly the same.

Mr. J. Carr (Area General Manager) said that the average cost of gas mains, service, and internal pipes was £32 per dwelling. Only £5 was charged to the landlord and it could be offset by the fixing of four appliances. Some area boards charged more, some the same and others a little less. Local authorities throughout the country at present paid £37 14s. for the installation of electricity.

### Cost to the Board

Asked what it would cost the Board to abolish the charge, the Chairman said that on the basis of the houses carcassed last year the sum would be about £85,000. It was pointed out that if the local authorities and other landlords did not pay the charge, the general consumers would have to do so. Many local authorities carcassed houses for gas and electricity. Taunton provided for both and between 50% and 60% of the tenants used gas. If there were any transfers, the Council arranged them with their maintenance department. Taunton Corporation provided appliances, but many Councils did not; if the tenant bought them he did not get the rebate. Immediately the Board gave preferential treatment to any Council, everybody knew in due time.

Mr. Carr said that in Bristol before nationalisation they charged £6 10s. per house for installing gas, and everybody paid it.

Mr. T. H. Martin said he understood that practically all local authorities in the south west had paid the installation charge, which was not excessive. If there were two or three awkward ones they must fall into line. Another member suggested the installation charge should be dealt with at Ministerial level. It was bound up with the prosperity of the gas industry and with competition from electricity.

The Town Clerk wrote stating that the Chard Borough Council had now agreed in principle that all future Council houses should be carcassed for gas and wired for electricity provided this did not hold up development in any way. This decision would automatically apply to the new estate at Jocelyn Way, in respect of which certain contracts had just been let.

A Taunton business man sent what one member described as an 'impertinent' letter. He wrote that he had been perusing a report of the Board and would like to know the qualifications of the members of the Consultative Council and the basis of their appointments. He also enquired what monies were received by those members either as salary, expenses or subsistence allowance; how often the Council met and whether its minutes were public.

The Secretary (Mr. A. A. Murrell) read his detailed reply, in which he stated that responsibility for the appointment of each member rested entirely with the Minister of Fuel and Power. Apart from the Council Chairman, who received a salary as a part-time member of the Gas Board, no salary was paid to any member of the Council. Expenses had to be paid within a scale laid down by the Minister (a summary of these was attached to the reply). The greater proportion of the Council meetings were open to the Press and members of the public.

**SOUTHERN**

# New Tariff Imminent

Mr. F. C. Rea, O.B.E., Chairman of the Southern Gas Consultative Council, announced at a meeting at Reading on March 3 that a special meeting of the Council would be held at Southampton on March 17 to consider a new gas tariff which the Board proposed to introduce. No details of the proposed tariff were yet available.

The chief item on the agenda for the Reading meeting was the report of the Industrial Sub-Committee appointed last June to examine the industrial policy of the Board. Mr. N. W. Gardiner, Chairman of the Sub-Committee (who was also a member of the Ridley Committee whose report was presented last autumn), said the report was based on the latest reports of the Gas Council and the area boards, correspondence from Tintometer, Ltd., and other industrial consumers, and replies from the Southern Gas Board to a questionnaire submitted by the Sub-Committee. In general, no facts or figures had been revealed to cause the Sub-Committee to recommend any alteration in the principle of the present block tariff, with power for the Board to make special contracts.

Existing tariffs came into operation in March, 1952, and in reply to a question whether experience gained in the working of the block tariff showed that it provided a fair distribution of cost between domestic and industrial consumers, the Board had stated that nothing in its experience altered its view that a tariff which provided for reduction in price for quantity irrespective of the purpose of its use gave reasonable equity. Apart from the case of one industrial consumer at Salisbury, no complaint had been received on the equity of the tariff. Industrial consumptions were generally higher than domestic, and the higher the consumption the lower was the overall average price.

The Sub-Committee, said Mr. Gardiner, felt the Board was right in its contention that price should be based on consumption only. If the Board tried to discriminate there would be no end of argument as to what constituted 'industrial,' 'commercial,' and 'domestic' consumers. The next question was whether the balance of the steps between small users and large users—or broadly speaking between the domestic and the industrial consumer—was the correct one, and on that point the Sub-Committee had compiled the following figures:

| Area | Average cost of gas pence per therm | Average industrial price pence per therm | Difference pence per therm |
|---|---|---|---|
| Southern .. .. .. .. .. | 16.76 | 16.17 | 0.59 |
| Eastern .. .. .. .. .. .. | 16.77 | 15.68 | 1.09 |
| South Eastern .. .. .. .. .. | 16.04 | 14.58 | 1.46 |
| South Western .. .. .. .. | 17.12 | 14.48 | 2.64 |

A comparative table was also given showing the percentage increases in price of gas in three representative parts of the area, as follows:

| | *Domestic* Present price compared with | | *Large consumer* Present price at 10,000 therms per quarter compared with | |
|---|---|---|---|---|
| | Pre-war % | Vesting day % | Pre-war % | Vesting day % |
| Reading .. .. .. .. | 94 | 38 | 104 | 68 |
| Southampton .. .. .. | 98 | 12 | 186 | 24 |
| Salisbury .. .. .. .. | 120 | 47 | 135 | 57 |

Comparison was made between prices at Reading and Bristol (South Western area). Published prices were: Reading, 17.5d. per therm; Bristol, 20.5d. per therm. Prices at consumption of 10,000 therms per quarter were: Reading, 13.5 per therm; Bristol, 14d. per therm.

The Sub-Committee was concerned with the relative prices of oil and gas and considered that if the margin already in favour of oil on price alone widened much further there would be a turnover from gas to oil by several industries, and the steady increase in gas consumption by industry due to increasing production might be reversed with conse-

quent loss of revenue to the gas industry. It was recommended that in any future alteration of tariffs the Board should be asked to consider these points and to investigate what alterations in the steps of the present tariff should be made to ensure equity between the larger and the smaller user.

### Two-Part Tariff

The Board had been asked if it was prepared to consider a two-part tariff, and had replied that two-part gas tariffs were normally applied to domestic consumers as an alternative to a flat rate charge and would not be appropriate for large industrial consumers. The block tariff was more flexible and allowed bigger reductions in price to be offered to consumers taking large quantities of gas. The Sub-Committee did not concur that a two-part tariff was not appropriate to industrial consumers, but agreed that simplification by having one tariff system was desirable, provided the special conditions created by a consumer with a high load factor could be made the subject of special negotiation.

Mr. Gardiner next turned to the question of gas prices at Salisbury, on which there had been a great deal of correspondence and, in some quarters, a certain amount of misrepresentation. It had been reported in *The Times* last October that Mr. Fawcett, of the Tintometer Co., Ltd., had applied unsuccessfully to be quoted a special industrial tariff by the Southern Gas Board. 'I have here,' said Mr. Gardiner, 'a letter signed by Mr. Fawcett in which he gives me the actual rates that his Company is paying, and it shows quite clearly that for consumptions over 10,000 therms per quarter the Company is receiving a special industrial price.'

### Torwards Uniformity

There had been suggestions from the Tintometer Co., and from certain other industrialists in Salisbury, that there should be a uniform tariff throughout the Board's area. On that point he could not do better than quote from the report of the Gas Council for 1952-53: 'The Ridley Committee recommended that the prices charged by gas boards should reflect local differences in cost of supply. It was stated in the Council's third report that boards had followed the broad principles of basing charges on the relative costs of supply. As integration proceeds, it is possible to extend the territory over which the same price applies, and simplification of prices is proceeding on those lines.' The Southern Board had been working on those lines and in the Central Division had, in fact, achieved a large measure of uniformity.

Admittedly the price of gas in Salisbury was high—the published price was 22d.—but there seemed to be no reason why in due course the Board should not be able to increase the efficiency of its installations and so bring down the price of gas. They hoped and trusted that the Board was making every effort in that direction, and he was hopeful that in the new tariffs to be considered at the special meeting on March 17 they would find increased efficiencies reflected in the new prices, not only at Salisbury, but in many other towns, particularly in the Western Division. At places like Southampton and Portsmouth, where the Board had the advantage of seaborne coal, which was much cheaper than railborne, he hoped to see still further improvements.

The report was adopted, and a resolution was carried expressing the hope that the Board would improve the efficiency of those installations where production costs were abnormally high, and that the benefits of such improved efficiencies would be reflected in future revisions of gas tariffs.

### Meter Rents

The question of gas meter rents came up again on a letter from the Board in reply to recommendations submitted by the Council. Regarding the resolution that uniformity in policy for meter rents seemed desirable, the Board stated that it had continued the practices as found at vesting date. Of the 63 undertakings which vested in the Board, only the Reading Company charged for ordinary meters in the price of gas. While appreciating the Council's feelings, the Board thought the existing policy should not be disturbed merely for the sake of uniformity. The Council's resolution would be borne in mind if and when any revision in gas tariffs became necessary.

New meter rental rates applied only to new or replaced meters and were based on the capital cost of the meters and costs of installation, repairs, etc., based on a meter life of 25 years. Rents for meters taken over at vesting date had not been raised, and had, in fact, been reduced in some cases.

Lady Nunburnholme described meter rents as 'an iniquitous charge,' and other members criticised what they considered the high level of meter rents being charged for new meters, and expressed fears that if the purchase price of new meters was increased in the future the Board would be faced with a bewildering variety of scales of charges.

It was agreed to ask the Board to consider the possibility of publishing a scale of meter rentals, so that when new contract forms were signed consumers could have some approximate idea of what they were going to have to pay for the various sizes of meter according to the extent of their quarterly consumptions.

One member of the Council said that when he recently asked the Board to install a new meter he was reminded that he would have to pay an increased rental, to which he agreed. His new quarterly gas bill turned out to be lower than he had paid for years.

### Ridley Recommendation

The South Western Gas Consultative Council asked the Council to support a resolution asking for the implementation of the recommendation in the Ridley Report that 'the Minister should be assisted in his general control over the price policies of the nationalised fuel and power industries by the establishment of a special tariffs advisory committee.'

Mr. Gardiner pointed out that the Minister had rejected the recommendation, and after some discussion it was agreed that the Council was not in a position to reach a formal decision on the matter, and would prefer to see the whole system working a little longer before coming to a conclusion.

Discounts for prompt payment of gas accounts were suggested by the Western Divisional Committee. A member said the system had been tried in regard to local rates and withdrawn, but other members visualised a substantial saving to the Board if by allowing, say, 2½% for prompt payment, it could save up to 4% interest on money borrowed over the extended period in which gas accounts were at present paid. Opinion was divided, but by 13 votes to eight it was agreed to ask the Board to consider whether discounts would be in its financial interests.

**EAST MIDLANDS**

# The Road to Economic Ruin

'The road to economic ruin is all too frequently paved with rises in the cost of living,' said Mr. Sydney Smith, Chairman of the East Midlands Gas Board, at a meeting of the East Midlands G.C.C. at Nottingham on March 2.

Mr. Smith, in a review of additional costs facing the Board resulting from price reductions and increased operating expenses, said that its decision to hold and absorb increased costs would amount to an extra expenditure of £630,000 a year. If these additional costs had been handed on to the consumer it would have meant an overall increase of 5% on all charges.

Continuing, Mr. Smith said: 'The opinion has been expressed that possibly the Board's decision to reduce prices was premature. This is certainly not the case, as the decision was taken only after the most serious consideration. Naturally we have taken steps to ensure that the financial situation does not get out of hand. We have instituted a new budgeting technique, the essence of which is to provide an up-to-date overall picture of our monthly income and expenditure, within a few days of the end of each month. By this means we are able to keep close check on expenditure and to have a quick indication of any excess spending over our monthly budget.'

### Appliance Demand Stimulated

It was too early to assess the full benefits which might be derived this year from increased consumption due to cheaper prices. All he could say at the moment was that public demand for gas appliances had already been stimulated by this policy, and there was reason to hope that the authorised dealer scheme would also bear useful fruit. At the same time existing costs would continue to be further pruned wherever possible.

'My Board are not prophets and we cannot foresee every economic eventuality,' he went on. 'We do not know, for example, what the price of coal is likely to be in six months' time; but if there is a coal increase and that increase is substantial we may have to consider higher tariffs. In this event we shall ensure that only the barest minimum increases are made. I would like to repeat the Board's earnest assurances that, as in the past, we shall seek the hard way out rather than the fatally easy one of increasing our charges. For, it might be said, the road to economic ruin is all too frequently paved with rises in the cost of living.'

Extra yearly expenditure facing the Board, includes: Price reductions, £160,000; wage increases, £100,000; staff salary increases, £50,000; freight charges, £120,000; and increased depreciation charges, £200,000.

During the cold spell in January and February, Mr. Smith said, record outputs of gas were achieved at the great majority of undertakings in the area. Gas sent out during the last week of January for the area as a whole amounted to 1,463,008,000 cu.ft., an increase of

14.3% over the corresponding week in 1953. Similarly for the first week of February it was 1,506,571,000 cu.ft., an increase of 12%. The record outputs were achieved without any voluntary reduction of pressure.

Attention of the Council was drawn to the wide disparity in rates of gas tariffs for domestic purposes in different parts of the area. A letter from the Market Harborough U.D.C., sent originally to the Leicester and Northants Divisional Committee, expressed the opinion that the time had come to operate the stated aim and policy that charges should be equalised.

Mr. Smith told the Council that the Ridley Committee had recommended that price charges should reflect the cost of production. In this part of the area the cost of production was higher than in those parts where good carbonising coal was obtained.

He pointed out that on vesting day there were some 400 different charges for gas in the area. These had been reduced to five zones for industrial supplies and four for domestic consumers.

Alderman C. R. Bates (Derby), Chairman of the Council, promised this matter would again be discussed.

The Council was assured that active steps were being taken to deal with gumming up of appliances in the Chesterfield area, and the Board was working in close collaboration with the N.C.B. which supplied coke oven gas.

**SOUTH EASTERN**

# Frankness About Delivery Delays

A motion calling for more frankness on the part of showroom staffs about possible delay in delivering appliances, was approved at a meeting of the South Eastern G.C.C. on March 2. The Chairman, Councillor A. B. Constable, expressed his own approval of the resolution and said the matter referred particularly to coke fires ordered before Christmas after a promise of delivery within three weeks. Delivery had taken three months.

At the previous meeting of the Council, it had been decided to ask the Board about its practice in obtaining advance payments for appliances. The Board's reply, read to the Council, was that in normal circumstances there should be no delay in delivery. Some time was allowed after an order was taken, for making the necessary arrangements so that 'delivery and fitting staffs are fully employed.'

The reply continued: 'There can be unusual delay if there is an abnormal rush of business or if appliances other than stock lines are ordered by the consumer. Some stock appliances are not in free supply, and the Board has a limited number to dispose of in any one period. This sometimes causes waiting lists to be made.' The Board tried to keep a sufficient stock of appliances which were in free supply from the makers, but the costs of keeping unduly large stocks were heavy because they were subject to damage and depreciation; interest charges had to be met on the money tied up, and extra storage space had to be provided.

The communication gave examples of the small advance payments asked for in hire purchase. The quarterly payments did not begin until the appliances were fixed. It was the general practice within the area not to ask for payment in advance when it was known that delivery could not be effected for some time, and also when appliances had to be specially ordered from manufacturers. The Board had been informed that certain consumers had been asked for advance payments for appliances which had not been delivered for some weeks, and these cases would be examined.

The resolution passed by the Council was to the effect that while appreciating that there must inevitably be delays beyond the Board's control, it should be ensured that showroom staffs were a little more frank about the position. The Board's statement in hand would be accepted with that reservation.

Councillor Constable thought there was a certain amount of push from the headquarters of the Board with regard to the sale of appliances.

At first, Councillor N. C. Rogers did not approve of a proposition going forward to the Board. He thought its effect might be restrictive to business.

## Liverpool Lighting

Liverpool Corporation Lighting Committee estimates that during the coming financial year it will spend £389,000 on street lighting and other works. During the year ending on March 31 it will have spent £370,818, and it has received an income of £134,280.

There will be a call on the city rates for lighting, etc., purposed during next year of £255,299, which represents a rate of just over 9¾d. in the pound.

The estimates include £35,000 for gas; £43,700 maintenance charges in connection with gas lamps; £43,000 for electricity and £73,590 maintenance charges of electric lamps.

New works include £13 890 on classified road lighting; £10,100 on unclassified, and £5,250 on passages, etc.

## Radiation Dividend Up

The Directors of Radiation Ltd decided at a meeting on March 4 to recommend a final dividend of 9⅛% against 6¼% at the same time last year, raising the total dividend for the year from 10% to 12½%. The preliminary statement for the year ended December 31 shows an appreciable increase in gross profits from £818,480 to £1,058,011. Much of the improvement is offset by taxation, which takes £636,785, compared with £451,413 for 1952, leaving a net balance of £421,226 against £367,067. The annual meeting will be held on March 31.

## Rheumatism in Industry

A new method for tackling one of the greatest causes of absenteeism in industry, rheumatism, has begun operation. A recent survey by the National Coal Board showed that losses due to absenteeism resulting from rheumatism totalled about £15 mill. annually. Throughout industry, loss of time from this cause affects not only ordinary workers, but craftsmen and executive.

One of the first tasks of the British Rheumatic Association has been to evolve an efficient way of tackling this problem on behalf of industry. Only a few general hospitals in the country have modern rheumatic units, and even these have few beds available. Diagnosis and treatment in the early stages of serious rheumatism are vital. Accordingly a policy is being followed of providing hostels linked with appropriate hospitals.

The first of these hostels has now been opened at Bracken Hill House, The Woods, Northwood, Middlesex. Here patients can be diagnosed and treated under the National Health Service at the rheumatic and rehabilitation centre nearby, Mount Vernon Hospital. At this early stage there are vacancies. Works medical officers or medical advisers who require particulars should write to the British Rheumatic Association, 11, Beaumont Street, London, W.1.

## MR. McTHERM MAKES MUSIC

How many brass brands are there connected with the British gas industry? So far we know of only one, the band of the Scottish Gas Board, but doubtless we shall soon learn if there are others. Recently, the band made history by winning the Scottish Junior Solo Championship—an annual event sponsored by the Scottish Amateur Band Association.

The winner of this year's championship cup and medal was 16 year old Jim McKirdy, principal cornetist of the band. In our picture Jim is seen receiving the cup from Mr. Donald F. Young, Divisional Controller, Glasgow Division. Also in the picture is Mr. D. M. Macbrayne, the band's Director of Music.

Jim, an apprentice gasfitter, is employed in the Glasgow District, and recently won the Hannaford Music Scholarship, which enables him to attend the National Youth Brass Brand Summer School which, appropriately enough, is being held for the first time in Scotland.

# Midland Juniors' Annual Dinner

The annual dinner of the Midland Junior Gas Association was held this year at Dudley on February 27. In previous years the dinner has traditionally been held at Birmingham.

Mr. J. A. Tomes, President, was in the chair. Also present were Mr. J. T. Haynes, President of the Institution of Gas Engineers; Mr. G. le B. Diamond, Chairman of the West Midlands Gas Board; Mr. Alex Lee, Deputy Chairman of the Board; Mr. L. G. Townsend, Chairman of the British Junior Gas Associations Joint Council; Mr. W. MacNaughton, Chairman of the Midland Section, I.G.E.; and members' ladies and guests.

Mr. Diamond, in proposing the toast of the Midland Juniors, spoke of his great admiration for the Association. He went on to stress the happy relationship existing between the East and West Midlands Area Boards.

On the gas industry in general, Mr. Diamond said there was more constructive thinking now than ever before. The organisation and work of the research teams had been increased, and there was much of promise in the work that had been done. The chemical engineer, in his efforts to produce substitutes for natural materials in an impoverished and disrupted world, was bringing new hope and a new outlook. Advances had been made in recent years so that synthetics had come to the gas industry.

### Continental Progress

Officially, and while on holiday, Mr. Diamond had had the opportunity of viewing activities on the Continent. In the Ruhr where a vast quantity of gas was distributed per day, it was said that the era of gaseous fuel was being entered, having passed from the period of solid fuel and the liquid fuel phase. Some of the Association members were to visit France in the spring, and they hoped to see the Gennevilliers gasworks in Paris. In his opinion these works housed the finest water gas plant in the world.

Recently, Mr. Diamond had visited the Algiers gas undertaking. The engineering staff had impressed him with their originality and constructive ability. They had designed an entirely new form of washing plant and a new form of tray purification, but he had been most impressed by the dynamic thought and energy brought to bear upon every gasworks process. The underlying key to the success of any enterprise was enthusiasm.

Mr. Diamond was delighted to see Mr. Tomes in the chair; the Board was conscious of his ability. Stourbridge had an international reputation in the glass industry, and Mr. Tomes was to be congratulated on being co-opted on to the technical committee of the glass manufacturers. He had taken an immense practical and technical interest in this industry.

### The President's Reply

Mr. Tomes, replying on behalf of the Association, thanked Mr. Diamond, and said his high opinion of the Association's efforts would be a source of satisfaction and encouragement to its members.

The Association was honoured by the presence of Mr. Diamond and Mr. Haynes, and they were also pleased to see Mr. Lee, who was retiring shortly. Mr. Lee had endeared himself to all by his kindness and consideration, as well as by his constant cheerfulness and good fellowship. Also retiring, and with them that evening, was Mr. Fras. C. Briggs, Divisional General Manager, Wolverhampton Division—a member of very long standing who had supported them on many occasions in the past. To both these members the Association wished long life, happiness, and contentment in their retirement.

Mr. Tomes also mentioned Mr. Stanley Jones, who, if he had not moved south would have been Chairman of the Northern Juniors this session. It was to be hoped that Midland meetings would afford him as much satisfaction as his own Association's had done.

The President continued that he was gratified to see no fewer than 11 past presidents present that evening. Before a man could become president of the Association, he had to have taken part in its activities, and that meant his outlook and technical education must have benefited. Mr. Tomes felt sure that while the past presidents present were proud to accept the office they were equally pleased to have a further opportunity to serve the Association. They had all made a contribution to the raising of the status of the Association to its present standard.

### The Purpose

The Midland Juniors comprised some 500 members. Mr. Tomes pointed out that some might wonder at their title as the average age was 40. He reminded the members of the expression: 'Whilst 40 is the old age of youth, it is the youth of old age.' The junior association was the only technical gas association a young man entering the industry could turn to, and it played a part in his training. Its aim was to enable its members to learn how the others did their job, and by means of papers and discussion to share the experience of colleagues in promoting and extending technical and practical knowledge.

Mr. Tomes said the nature of the Association was such that a Junior was always a Junior and many engineers of high position still enjoyed taking part in their discussions. In this age of specialists the Midland Juniors brought people of like interest together. There was always the need for such a meeting place to enable the exchange of ideas and information. The Chairman paid tribute to the work done by the Council and particularly by the Secretary, Mr. H. J. Reynolds. He thanked them all for the help they had given him during the session.

Mr. Tomes thanked those firms which encouraged their technical men to join the Association, and those who from time to time gave them hospitality. On behalf of the Association, he thanked the gas boards, and in particular the W.M.G.B., for their assistance and encouragement.

Mr. S. C. Crathorn proposed the toast of 'The Ladies' and Mrs. J. A. Tomes responded.

Mr. Reynolds, proposing the toast of 'Guests and Visitors,' said how thrilled they were to have the President of the Institution and his wife with them.

### Juniors' Responsibility

Replying, Mr. Haynes extended greetings from the Council of the I.G.E. He said that the Institution appreciated the team spirit of the Juniors and seniors and assured them that Mr. Townsend put in a great deal of effort and thought on their behalf. Many Juniors came into closer contact with the workers than those in more senior positions; and because the gas industry had so little labour trouble, a great responsibility rested on their shoulders. Mr. Haynes spoke at some length on the work of the Benevolent Fund Committee and he asked the Association to support it.

He looked forward to a fine paper being read by a Junior at the Institution meeting and said that all papers forwarded for consideration would be carefully read by him.

Mr. Alex Lee, also responding, briefly traced his 47 years in the industry and indicated the growth of the industry in that time. As one who had recently served on selection committees, he said there appeared to be some reluctance to apply for advertised positions. While appreciating the current difficulties, Mr. Lee urged them to overcome this hesitancy; to take advantage of the various training schemes for advancement, and to take technical qualifications.

Mr. C. B. Jones was toastmaster and Mr. H. J. Reynolds compèred the entertainment which followed.

## Scottish Design Congress

The Scottish Committee of the Council of Industrial Design is holding its third major event on May 26 and 27—a Scottish Design Congress which it is anticipated will attract attention far beyond the confines of Scotland. A list of prominent speakers has been arranged and invitations to attend have been sent to organisations and individuals in a dozen overseas countries.

Lord Home, Minister of State for Scotland, has agreed to open the congress, and thereby to underline the importance attached to the proceedings by the Government and the Scottish Office. The theme of the congress will be the promotion of design as a high level responsibility in industry, commerce and the public services. Speakers have been drawn from a wide field, and it is hoped to have representatives from organisations particularly interested in industrial design from other parts of the United Kingdom, and also from abroad. An exhibition illustrating development in design during recent years, and a selection of current products of outstanding design will form a background to the papers and discussions.

Delegates will be entertained by the City of Edinburgh at the City Hall on the evening of May 26, and there will be a formal dinner to close the congress on May 27.

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**Mr. Taylor,** Chief Instructor of Ascot Gas Water Heaters, Ltd., has recently completed a successful lecture tour, covering the South Eastern Division of the Scottish Gas Board, during which two-day instructional courses were given to fitting staffs, maintenance and sales personnel, at the Falkirk, Galashiels, North Berwick, and Kelso centres. At these centres representatives from all the undertakings throughout the Division underwent a practical course of instruction on the complete range of Ascot appliances.

# IN PARLIAMENT

### *Accidents in Industry*

The Safety in Employment (Inspection and Safety Organisation) Bill provides for the annual election of 'safety' delegates at a place of employment where more than five persons are employed, with statutory power to inspect the place of work, to draw the attention of the management to unsafe conditions, and to report to any official inspector when proper precautions are not taken. Where fifty or more persons are employed the Bill provides for elected safety committees, with workers' and employers' representatives having power to inspect and report unsatisfactory conditions at the place of work. The Bill also provides the basis for the institution of a National Occupational Safety and Health Committee to co-ordinate accident prevention and to recommend research and new legislation. In an explanatory memorandum attached to the Bill it is stated that the annual rate of accidents in all employment, based on the reports of the Minister of National Insurance, is on average in the region of 700,000 a year.

Moving the second reading of the Bill, Mr. W. T. Paling (Lab., Dewsbury) said there were some 10 to 11 mill. workers in respect of whom there were no statutory regulations regarding safety at work, and among them there were about 290,000 accidents a year. It was estimated that the loss to the country as a result of the accidents was at least £100 mill. a year.

Factory and mine inspectors did a good job, but there were not enough of them. The low pay did not attract recruits. Fewer than 4,000 safety committees existed in the 240,000 establishments governed by the Factories Acts, and existing methods of ensuring safety had not substantially reduced the number of accidents. The employee under existing legislation had hardly any right to assist in the enforcement of safety standards although he ran all the risks; his only real right was to leave his job if he disliked the conditions.

The Bill proposed that where more than five people were employed all employers and employees must co-operate to set up accident prevention machinery, that safety delegates were to be elected and given the power of inspection and of making complaints about bad conditions to the appropriate inspectorate. Where more than 50 were employed a safety committee would be elected from both sides and would be given definite powers. The Minister was given powers to exempt any industry where the existing arrangements were as good as or better than those proposed in the Bill.

Mr. M. S. McCorquodale (Con., Epsom) did not support the Bill. He favours voluntary co-operation. The Bill, he argued, and at some length, might seriously, if not fatally, damage that co-operation. And Mr. Spencer Summers (Con., Aylesbury) contended that the Bill would take from management that proper responsibility for health and safety which rightly rested on its shoulders. On the other hand Miss M. Herbison (Lab., Lanark) argued that, by placing responsibility on the employees for ensuring that proper safety measures were taken, the Bill would bring out the best qualities of the workers and there would be much better co-operation between them and the employers. Sir Harold Sutcliffe (Con., Heywood and Royton) backed up Mr. McCorquodale in his advocacy of the voluntary system.

The Parliamentary Secretary, Ministry of Labour (Mr. H. A. Watkinson), said the Bill was not a practicable proposition. His Department had examined it carefully. As a result, the view was taken that the Bill would not make a practical contribution to greater health and safety. In 1927 accidents were at the rate of 30 per 1,000 persons employed; in 1952 the rate was 22.5. That was not an acceptable rate, but it was untrue to say that there had been no reduction. The Ministry already enjoyed considerable powers of compulsion. It would continue to use them wherever it was thought they could fulfil a useful function.

There was, continued Mr. Watkinson, a wide section of employment not covered by health and safety regulations. The Ministry was considering proposals to give effect to the Gowers Committee recommendations for safety and welfare in certain industries. The Ministry was also considering the Dale report, which had come before the national joint advisory committee. The Ministry was, in fact, examining the whole question.

It was important that the voluntary principle should be retained. Under the Bill there would be 80,000 safety delegates, each in a position to exercise statutory powers in his own individual right. That would present the Ministry and the Factories Department with a formidable problem. At present any worker or group of workers could approach a factory inspector, and any complaints would be rapidly and fully examined. There were 3,225 voluntary committees in factories, representative of management and workers, whose functions included the promotion of safety and health among workers.

The Bill, Mr. Watkinson concluded, would remove the voluntary principle entirely. The methods proposed in it were wrong in principle. Co-operation was everything, and the Factories Acts contained adequate powers to apply compulsion where it was needed.

After further debate, Mr. Paling moved the closure. The motion was negatived by 82 votes to 75, majority 7. As fewer than 100 members voted for the motion, the debate was adjourned.

### *Atomic Energy*

In moving the second reading of the Atomic Energy Authority Bill, the Minister of Works, Sir David Eccles, said the general public had still to realise that the new science was most expensive. In Britain, in the years 1946-51, over £100 mill. had been spent; expenditure was now running at over £50 mill. a year; this figure would rise. Under the Bill it was proposed to transfer research, development, and disposal of radio-active substances from the Lord President to the Atomic Energy Authority.

Sir David Eccles proceeded to say that, looking ahead, beyond the race to pile up atomic weapons, no time should be lost in preparing for the day when the civilian uses of atomic energy were as important to our economy as weapons now were for our defence. Parliament and industry ought to know what was going on. Once they began to treat part of the atomic programme on all fours with any other major industry, a Government department was not the best form of organisation.

'It is,' he said, 'no good looking to the nationalised industries for a ready-made pattern. . . The Authority will place contracts with universities and with industry. . . It looks as though the most important use will be for the generation of electricity.'

The Minister explained that the Government is building the first atomic power station in this country at Calder Hall, in Cumberland, and that when the prototype had demonstrated the soundness of the design, the electricity authorities would be free to place orders. They would buy their fuel from the Atomic Authority.

### *Dome of Discovery*

It had been decided, said Sir David Eccles, to construct a breeder type of reactor at Dounreay, in Caithness. For safety's sake the plant would be housed in a spherical steel shell; and there was every hope that the fast reactor would show the way to remarkable economies and would become 'a world-famous pioneer among the plants which provide electricity in the next generation.'

A long discussion was wound up by Mr. H. Crookshank, Lord Privy Seal, for the Government; and on a division the second reading of the Bill was carried by 244 votes to 226.

## PARKINSON STOVE SALES CONFERENCE

*The annual sales conference of the Parkinson Stove Co., Ltd., took place this year on February 10, 11 and 12. The photograph taken at the conference shows J. L. Anstey, Sales Manager, in the centre of the group, with C. T. C. Woodall, London and Home Counties Sales Manager, on his right. On Mr. Woodall's right is T. C. Whimster, Area Manager—South Eastern. On Mr. Anstey's left are L. Mandy, Sales Manager of Parkinson Water Heaters, and C. A. Ogden, Area Manager—Eastern.*

*Second row (left to right): D. W. Mills, Publicity Officer; S. A. Ward, Area Representative—South Western; K. F. Hollingsworth, Area Representative—West and East Midlands; E. J. Ducker, Area Manager—Northern and North Eastern; A. Sadler, Area Manager—Wales; and F. S. Clegg—Northern Ireland.*

*Back row (left to right): L. Fletcher, Area Manager—Scotland; F. G. A. Didden, Assistant to Mr. Woodall; R. S. Howe, Sales Superintendent; J. G. Renton, Area Representative—Southern; and E. Culshaw, Area Manager—North Western.*

## Industrial Art Bursaries

The Royal Society of Arts has issued a list of the successful candidates in its Industrial Art Bursaries Competition for 1953. In all, 232 candidates entered from 60 schools and industrial establishments. A record number of 18 bursaries was awarded amounting in value to £2,400, which compares with £2,225 in 1952, and brings the total sum awarded in these competitions since 1946 to £11,740. In addition to bursaries nine winners will also be eligible for Associate Membership of the Society. Prize-winning and commended entries were received from schools and colleges in London, Aberdeen, Birmingham, Blackburn, Bonnybridge, Brighton, Carlisle, Coventry, Derby, Edinburgh, Glasgow, High Wycombe, Kingston-on-Thames, Leeds, Leicester, Northampton, Nottingham, Poole, Salford, and Worthing.

An exhibition of winning and commended designs will be held at the Society's House, 6-8, John Adam Street, Adelphi, W.C.2, between May 19 and June 4. The Society is this year celebrating the bicentenary of its foundation, and with this in view it has been decided to show at the same time as this exhibition a selection from the industrial designs submitted by students in the 18th century for the Society's premiums. Reports submitted by previous bursary winners on their tours abroad will also be included in the exhibition.

Successes in the 1953 competition included the award of bursaries in the domestic gas appliances section to Colin R. Cheetham, Winchmore Hill (L.C.C. Central School of Arts and Crafts), and John L. Fagg, Richmond (Kingston School of Art).

## 'Gas and Money'

'I would like to see still further reduction in the number of very small gas-making plants, with consequently greater benefits to consumers, and, for some places, cheaper prices,' said Sir Andrew Clow, Chairman of the Scottish Gas Board, when he spoke in Dunfermline on February 25. He was addressing the local branch of the Women's Gas Federation, at its monthly meeting held in the Gas Board showrooms. Mrs. William Anderson, President, was in the chair.

Sir Andrew chose for the title of his subject, 'Gas and Money.' He explained how each £ of income was earned and each £ spent. The purchase of coal to manufacture gas had cost the Board over £9 mill. last year, out of an expenditure of about £22 mill. Wages had accounted for another £4½ mill. Of every £ of the Board's income, 11s. 4d. came from the sale of gas, pre-payment consumers contributing about 43% of the total sum.

The biggest by-product was coke, and he was glad to see that controls on the sale of this had been removed. He did not think people sufficiently realised its importance. The mild weather had caused coke stocks to become rather alarmingly large at some gasworks, but sales in Fife were, on the whole, pretty good.

Mrs. J. Wilkie, Vice-President, asked Sir Andrew if it was not possible for the Government to pass a law controlling the fitting of gas appliances. Any plumber was allowed to undertake the work, and one read of tragedies and accidents through faulty fitting.

Sir Andrew replied that demand was so great in some places, particularly for cookers, that the Gas Board did not have sufficient staff to do the work of fitting quickly. Therefore, it was encouraging the co-operation of good plumbers. The Gas Board went a good deal further than some industries, for nearly all appliances were sold by the Board itself, whereas, in electricity, for example, appliances were sold by private dealers who did their own fitting.

## British Standards in Relation to Safety

During the past few years, the British Standards Institution has issued a number of standards covering mechanical and non-mechanical plant used in the building and civil engineering industries and ranging from excavators to scaffold boards. At a meeting of the London Building and Engineering Contractors' Accident Prevention Group in February, Mr. P. Cutbush, and Mr. Woodbridge, Assistant Technical Directors of the British Standards Institution, gave a talk on the organisation of that Institution. There are about 2,400 committees, which hold about 3,500 committee meetings a year—nearly all technical—and involving about 14,000 members. The work of these committees covers practically all industries.

Before a standard is finalised, representatives of all sections of the industry involved, and all the users or consumers, as well as representatives from related Government Departments are consulted. The committees are in fact drawn from industry to give their expert advice. It was interesting to note how human the technical committees can be, ensuring for example, that any article such as protective clothing is not only satisfactory so far as protection goes, but is also likely to be acceptable to the wearer as regards appearance and comfort.

Mr. Cutbush and Mr. Woodbridge were able to demonstrate that safety is an important factor in determining the standard for such plant as metal scaffolding, scaffold boards, etc. A standard for wheelbarrows, for example, takes into account the fact that they are hoisted aloft slung by chains, as well as serving their normal purpose. Examples were given where traditional methods had been found on test to be positively harmful, and even dangerous. In so far as plant is concerned, the standards not only serve to assist in the purchasing, but also provide a standard to which plant in use should comply. For metal scaffolding, scaffold boards, and for many others items, tests are described which can be applied at plant depôts or on sites.

'Fitness for purpose' is the aim of the British Standards Institution, but it avoids being too rigid. The Institution does not impose its standards on industry. They are recommendations to which producers and purchasers can work, and which assist by giving clear definitions for use in Government regulations and other official documents.

## ST. DAVID'S DAY TREAT

Mr. Therm is again to be brought before the Wales public eye thanks to a second edition of the Wales Gas Board's booklet of traditional Welsh dishes and recipes. Mr. T. Mervyn Jones, Chairman of the Board, announced the publication of the second edition at a Press conference in Cardiff, and said its purpose was to help hoteliers and caterers to provide truly Welsh hospitality.

'When in Wales, the visitor should be entitled to enjoy the food and no less the language of the country,' he said. The new booklet was on sale to the public at the Board's showrooms and offices throughout Wales on St. David's Day, and was distributed to the hotels in the Principality.

In order to cater for several Welsh organisations in London a special supply was sent to the North Thames Gas Board and was available at its showrooms on March 1.

The first edition of the booklet has been extended to include a list of seasonable menus with their Welsh translations and since the initial announcement of its publication requests for copies have been received from Gold Coast, India, Suez, and Benghazi.

The Board's direct concern with the publication is the cooking angle. 'We have a strong commercial interest in it,' Mr. Jones explained, 'because cooking is the biggest single load we have as an industry. We feel we are vitally interested in the success of the hotel industry.'

*During the morning a number of prominent people in Welsh life visited the showroom. Our photograph shows Mr. Osian Ellis, the well-known B.B.C. and television harpist, and Mrs. Myfanwy Howells, Editor of 'Croeso Cymreig,' the Welsh recipe book, who is also well known to women for her cookery talks in Woman's Hour and on television.*

For St. David's Day, the Board arranged for special displays of some of the dishes contained in the booklet to be on show at the Cardiff showrooms. Welsh speaking cookery experts were in attendance and there were displays of icing sugar models, etc., by the students of Cardiff Technical College, depicting various aspects of Welsh life.

Although there was a heavy fall of snow during the morning the crowds that gathered round the windows were so great that the services of a number of policemen had to be engaged to prevent serious obstruction. The recipe book was available, and some 400 copies were sold during the demonstration.

## Microfilm Saves Space

Micro-film equipment installed recently at Radiant House by the Liverpool Group of the North Western Gas Board will soon make it possible for a second large showroom to be opened in Bold Street. In the Radiant House basement a large area of valuable floor space has up to the present been occupied by a store of essential records. These are now being recorded on micro-film by the Liverpool Group's staff. The micro-film will in future occupy only a small fraction of the space hitherto taken up by the original documents: each 100 ft. roll of film, no bigger than a packet of 20 cigarettes, can bear no less than 24,000 cash receipts or 12,600 gas bills.

The extra space made available in this way will enable the building's pre-war basement showroom, now in use as a staff café, to revert to its original function. A new café will be set up in the space vacated by the records store.

Micro-filming of the Group's records is expected to take some three months to complete. The equipment will then be made available to other Groups in the Board's area.

## North Eastern Board Fined

The North Eastern Gas Board was fined £5 and ordered to pay 5s. witnesses' fees at Keighley Borough Court for selling coke below weight. It was stated that on January 18 a weights and measures inspector saw a lorry delivering coke on behalf of the Gas Board, laden with 20 sacks of coke. A weigh note was produced for 10 cwt., and it was found that the total weight was 1,055 lb. —an overall deficiency of 65 lb.

There was an exceptionally big variation in the weights of the different sacks; in some instances the variation was as much as 16 lb. It was subsequently found that the Gas Board's weighing scales at the Thwaites depôt were 3 lb. out of balance against the seller, which meant the purchaser should have been getting more weight rather than less.

On behalf of the Board, Mr. S. L. Brunt said there was no purpose in the Board trying to cheat the consumers as the consumers were the owners of the Board. He stated that the weighing machine had been found to have a worn screw and as a result small coke had been slipping down the back of the machine. This had since been remedied.

# New Blast Furnace Inaugurated

A great new blast furnace, said to be the largest in Europe, was blown in at the ironworks of the Appleby-Frodingham Steel Co., at Scunthorpe, on March 1, by Sir Walter Benton Jones, Chairman of The United Steel Companies, Ltd. Sir Walter referred to the strides made in iron manufacture in the last 80 years. In 1873, he said, there were 13 blast furnaces in Lincolnshire, of which nine were in blast. Pig iron made in that year was about 52,000 tons and average output per furnace in blast was about 5,786 tons. In 1953 there were 13 furnaces built and 12 in blast. Pig iron made was 1,560,000 tons and of this quantity 975,000 tons were made at Appleby-Frodingham. Output per furnace in blast for the county was 130,000 tons.

At the beginning of 1953 Appleby-Frodingham had seven furnaces. When the two latest furnaces are completed the South Ironworks will be a four-furnace plant which is expected to produce 1,300,000 tons a year; average production per furnace will then be 325,000 tons. No. 3 furnace is expected to make 6,000 tons per week, which is as much per furnace in a week as the average Lincolnshire furnace made in a whole year in 1873.

The new furnace will be the largest in the country: its neighbour the largest in Europe. It has a hearth diameter of 27 ft. and a working volume of 43,000 cu.ft. It is equipped with 18 hearth tuyeres and nine bosh tuyeres. Using a 100% sinter burden it is hoped that outputs of well over 6,000 tons a week will be regularly obtained.

Because of the low-grade British ores as used in these works more slag, per ton of pig iron produced, is made than in any other plant in the world. To produce 6,500 tons of iron means the production of 8,500 tons of slag, which is a total of 15,000 liquid tons in a week. The production of such large quantities of slag has necessitated the introduction of a third slag notch instead of the usual two, and this is a unique feature at Appleby-Frodingham. Carbon refractories are used exclusively on the hearth and bosh but the stack is lined with the orthodox fire brick construction.

**Tekon, Ltd.** (Technical Consultancy and Agency Services) has moved from 17, Broadstone Place, W.1, to 50, Baker Street, London, W.1. (T/N WELbeck 6175.)

# THE PERL MAGNETIC GAS VALVE

## Results of Tests by Two Gas Boards

The Perl magnetic gas valve Type 70 is a ½-in. B.S.P. A.C. solenoid gas valve. It is a recent addition to the range of valves made by Perl Controls, Ltd., 672, Fulham Road, London, S.W.6. Production of two further sizes, ¾ in. and 1 in., is planned. It is intended for use either directly for small gas supplies, or indirectly in relay operated systems. It is made in one size only. The makers also propose to use the solenoid unit on their Type 60 magnetic diaphragm gas valve in preference to the larger unit now in use.

The valve is suitable for horizontal pipe fixing and is provided with ¼-in. B.S.P. parallel female attachment threads. The solenoid is operated on a 230 volt single-phase A.C. supply; the valve is arranged to open when the coil is energised. The valve body is in die-cast aluminium alloy, provided with brass seatings to ensure resistance to wear and to minimise the possibility of sticking. The solenoid and moving parts have been designed to give silent operation and freedom from sticking in the open position.

### Tests by N.T.G.B. and N.E.G.B.

Tests carried out on the valve sample submitted to the North Thames Gas Board have given the following results: *Resistance to Flow*—The valve passed 45 cu.ft. per hour of gas of specific gravity 0.5 at 0.3 in. W.G. pressure drop. *Internal Soundness*—With the valve closed, no let-by at 12 in. W.G. inlet pressure was observed. *Maximum Inlet Pressure*—The valve should not be used at inlet pressures in excess of 35 in. W.G., as the forces acting upon the valve bob would then be sufficient to prevent it from opening. *Soundness*—The casting and its joint with the solenoid housing were found to be sound when tested with air at 100 in. W.G.

For the purpose of a life test, the valve was submitted to the North Eastern Gas Board. It was fitted into the gas supply to a small bar burner. A thermostat heated by the burner actuated a ½-in. Perl relay valve; a Bray jet was fitted to the outlet which also applied pressure to a standard Keith Blackman low pressure cut-off switch. The inlets to the relay valve and the magnetic valve were joined to a gas supply governed at 2 in. W.G. pressure. An Alexander Wright pressure recorder recorded the pressure in the gas supply to the bar burner downstream of the magnetic valve. The intermittent on and off operation of this valve was controllable, initially, by the adjustment of the height at which the thermostat was placed above the burner.

The Bray jet connected to the outlet of the relay valve acted as a pilot owing to the capacity of the gas held under the diaphragm on both the relay valve and safety cut-off valve and their connecting pipes.

The frequency of operation of the magnetic valve was one cycle every 4 sec. The pressure recorder fitted on the outlet of the magnetic valve gave chart markings of a blurred nature and, therefore, did not permit the counting of the number of cycles. However, the point of failure of the magnetic valve was automatically recorded. The frequency of operation of the solenoid was checked at three-hourly intervals throughout the normal working day, and a point of failure was reached after approximately 147,150 operations.

The valve was removed from the test and stripped down for examination. The valve seat and valve bob were in perfect condition and generally there appeared to be no serious sign of wear.

When the coil was tested it was found that there was a direct short from the coil to case. A superficial examination of the coil failed to locate the position of the short before the valve was returned to the makers with a report of the test.

The manufacturers have subsequently stated that they believe the electrical failure to have been due to the type of insulation used between the coil and case, which they have now changed. They also claim to have life tests of over 500,000 cycles without failure.

### A Rigorous Trial

The conditions under which the life test was carried out were much more rigorous than those met with under normal industrial conditions and a frequency of operation of 4 sec. would seldom be met with in practice. Throughout the test the surface temperature of the case enclosing the coil was measured: it was found to be 100°-115°F. However, the instrument used was not of the recording type and the temperature at the time of failure is not known, as the failure took place at night.

It was recommended that the body attachment threads should be of taper form instead of parallel and the manufacturers have agreed to the change. This valve may be considered to be satisfactory from the point of view of performance and construction. The life test indicates that a reasonably long useful life under adverse conditions may be expected.

The foregoing information is contained in Gas Council Industrial Gas Development Report 541/53.

# COMPANY NEWS

### THOMAS W. WARD

The Board of Thos. W. Ward, Ltd., proposes to increase the authorised share capital from £2,200,000 to £4 mill. and to capitalise £1,100,000 of the Company's reserves by applying such sum in paying up in full £1,100,000 £1 ordinary shares. These shares are to be allotted by way of bonus among the ordinary shareholders on a one-for-one basis so that the ordinary share capital will then become £2,200,000. Application is being made to the Capital Issues Committee for permission. The purpose of this proposal is to bring the ordinary capital somewhat nearer into line with the actual capital which it represents, and to allow for a margin of authorised capital to be available should it be required in the future.

### DOUGLAS GAS COMPANY

Receipts from gas and residuals were higher, but the increases resulted from advances in prices and not from increased sales, which were actually less than in the previous year, said Mr. W. S. Waid, Chairman of the Douglas (Isle of Man) Gas Company, at the annual meeting of shareholders. The reduced sales might be due in part, he added, to the 'not so good season,' but certainly the exceptionally mild weather experienced in the last quarter of the year was a factor for it was in that period they suffered their greatest setback in consumption of gas and sale of coke. The expenditure on coal exceeded that for the previous year by over £7,000, notwithstanding that they carbonised over 1,600 tons less. The report showed an increase in net profit last year of £1,353 (£10,072 compared with £8,719), and recommended the same dividend as last year—16.8d. per £1 share (including the interim dividend of 7d. per share). This represents a yield of 7%. The profit and loss account showed that the sale of gas, residual products, rents of meters, stoves, etc., and profits on appliances brought in £177,518, against £168,884 last year, and the manufacture of gas, raw materials, purification, carbonisation, repairs and renewals of works cost £136,269, compared with £128,313 in 1952. Distribution of gas, maintenance of mains, meters, etc., cost £11,614, against £12,413. Salaries and general expenses rose from £7,340 to £8,061. The balance carried forward is £6,787, against £6,771 in 1952. The Chairman added that towards the end of the year, with the helpful co-operation of the Harbour Board, they experimented with the discharging of several cargoes of coal by mechanical grab. From the experience gained they were of opinion that that method of unloading, if they were enabled to utilise it in the manner best suited to them, would be more speedy, convenient, and much more economical with consequent cheapening in the production of gas. The Company was a statutory one, he added, and as it was restricted in its dividend to shareholders, any benefits arising from a saving in discharging costs would accrue to the general public.

### ALLIANCE AND DUBLIN

The directors of the Alliance and Dublin Consumers' Gas Company recommend a final dividend for the year ended December 31, 1953, on the consolidated ordinary stock at the rate of 3½% actual, less tax, against 3% for the previous year. The surplus on revenue account, after providing for taxation, less a credit of £19,840 from over-provision in previous years, was £92,028, compared with £84,162 for 1952. After providing for interest on debenture stock and interest on temporary loans, there remains £98,558 against £87,852. When dividend has been paid the carry-forward will be £21,233, against £20,247. The price of gas was reduced by 1d. per therm on May 4 and by a further ½d. per therm on August 31, due to changes and economies in the Company's operations which recently became possible, thereby showing a saving to consumers of over £100,000 per annum.

# Trade News

## Super Hi-Lift Shovel

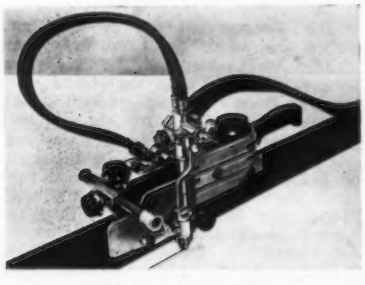
The Chaseside Super Hi-Lift shovel is being used extensively at gasworks and elsewhere throughout the country for the loading of the hoppers of weight-batching plants, and many scores of the same type of machine have been exported. The

½ cu. yd. model has a discharge height of 13 ft. 7½ in. and the machine fitted with a ¾ cu. yd. scoop has a discharge height of 13 ft. 3 in. Our photograph shows one of the latest models. *Chaseside Engineering Co., Ltd., Station Works, Hertford.*

## Portable Flame Cutting

Three years ago the Oxhycarbon Company brought out the 'Quicky' portable flame cutting machine. This compact unit found a very ready home in numerous boiler makers, structural and general engineers, and repair shops throughout the country. It was capable of doing most of the work that previously had had to be done by heavier and more expensive machines, and it also became widely used for ordinary straight line cutting in fabricating and repair shops on work previously done by hand cutters. The result was more accurate work and a better finish.

A new and improved model, known as the 'Quicky' 'B,' is now available. It incorporates a more powerful electric motor, an improved gear box with worm-



*The 'Quicky' 'B.'*

wheel drive, and a method for raising and lowering the cutter while the machine is cutting.

The 'Quicky' 'B' is a straight line and circle cutting machine weighing only 13 lb. It is designed to cut steel from $\frac{3}{16}$ in. to 2½ in. thick and is powered by a universal 220-240 or 100-120 volt A.C./D.C. electric motor. A simple rheostat comprises the speed control, which is graduated directly in plate thickness to be cut, thus rendering a tachometer superfluous. The machine will cut bevels, and guided by hand can be used for very simple profile work.

The machine is normally supplied complete with a circle-cutting trammel for cutting circles from 2½ in. to 40 in. diameter, a 3 ft. guide rail for straight line cutting, and a cutter with box of nozzles. The cutter will work with acetylene, propane, coal gas, or hydrogen, provided the correct nozzles are fitted for the type of fuel gas to be used.—*Oxhycarbon Co., Ltd., 6, Hainthorpe Road, West Norwood, London, S.E.27.*

## 'Bitumastic' Pipeline Castings

From Wailes Dove Bitumastic, Ltd., Hebburn, Co. Durham, we have received a copy of the firm's 'Bitumastic' pipeline coatings data book. In an introduction to the book it is mentioned that the cost of replacing corroded pipelines has recently been estimated to amount to £5 mill. per annum in the United Kingdom alone. Obviously this loss to the national economy and to individual pipeline operators calls for the most effective measures against corrosion to be taken at the very outset. The present booklet, with this object in mind, has been designed to outline the causes for these losses and to supply useful technical data to enable engineers to give sound protection to their pipelines by the most modern methods.

## Development in Arc Welding

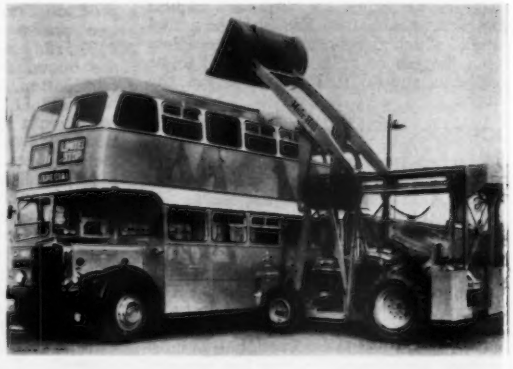
The new metal rectifier arc welding set (Type MR.375) introduced in this country by the Quasi-Arc Co., Ltd., is now installed in a number of leading engineering works. Some of these concerns have equipped complete welding bays with Quasi-Arc rectifiers, which they find give an improved source of D.C. supply for welding.

The MR.375 metal rectifier (illustrated here) provides D.C. power, which compares well in efficiency with A.C. plant and is a considerable advance over motor generators. Remote control is a feature of the equipment, which enables adjustment of the current at the actual point of welding.—*Quasi-Arc Co., Ltd., Bilston, Staffs.*

## New Mechanical Loader

E. Boydell & Co., Ltd., announce the introduction of a new high-lift loader, the Muir-Hill 'Supalift,' having a clearance of 14 ft. 6 in. under the lip of the tipped bucket when fully raised. Dangers to stability resulting from an increased loading height have been minimised by the special Muir-Hill system of suspension. The new machine retains a safe working stability even with full load at maximum height and forward reach. Intended primarily for feeding and loading elevated hoppers, it is available with either a standard ¾ cu. yd. bucket or with a coke-type 1 cu. yd. full-width scoop.

During a recent test under actual working conditions the loader easily negotiated a 1-in-7 ramp to load 15 tons of sand in 15 minutes into a bin over 11 ft. in height from the top of the ramp. The greater height and reach of the Muir-Hill loader caused the bin load to be spread considerably more than is usual and thus the widest section of the bin filled more adequately than is normally possible. Total weight without ballast is 4 tons 7 cwt., and maximum bucket lip reach forward is 4 ft. 5 in. Diesel powered and with driver's weather protection to order, these machines are available for early delivery. *E. Boydell & Co., Ltd., Elsinore Road, Old Trafford, Manchester, 16.*



*This photograph of the new Muir-Hill 'Supalift' loader serves to illustrate the advantage of the high under-bucket clearance.*

## Foster Transformers, Ltd.

Foster Transformers, Ltd., recently celebrated the fiftieth year of their foundation, and have published a brochure to mark the occasion. This 24 page booklet, which os fully illustrated, not only outlines the history of the Company but also describes the range of products now manufactured. Product development is an important aspect of the Company's enterprise. Each proposed new development is examined by a panel of specialists, under whose guidance a prototype is made in the experimental shop. The protoype is subjected to exhaustive tests until the panel is satisfied that a production prototype should be made. This again is tested until it has been proved ready for bulk production and marketing. The experimental shop is also used widely to produce prototypes to customers' specific requirements. This service provides quick results and is an integral part of that co-operation between supplier and customer which a specialist company must always provide. Chosen from the members of the contracts, design and drawing offices, the specialists are concerned with all problems of electrical or mechanical design and of application. They are in touch with customers through the sales organisation, and through them the fund of Foster knowledge and experience is at the disposal of both established and potential customers.

## Metal Cutting Oils

A 'quality' booklet has been produced by Edgar Vaughan & Co., Ltd., Legge Street, Birmingham 4. For over half a century the name Vaughan has been associated with the metal working industry. The firm was, in fact, one of the earliest firms in this country to market cutting oils with sulphur additives, to blend saponifiable and mineral oils for cutting purposes, to use extreme pressure additives in cutting oils, and to introduce soluble oils forming a transparent fluid. The company claim to have been the first to develop and manufacture, in 1951, yet another revolutionary product—a cutting-oil base miscible in water for use on automatics.

Edgar Vaughan & Co., Ltd., maintains seven manufacturing plants in Great Britain and has a strong research division where newer and better products are being developed to serve the industries. A corps of trained representatives is employed qualified to investigate and advise on the selection and most appropriate application of the firm's products. Supplies of many Vaughan products are available in the Colonies and the majority of foreign countries.

The booklet deals with metal cutting oils, drawing compounds, hydraulic oils, rust preventives, lubricants, leather packings, and industrial cleaners. 'Houghtoclean' is the name under which Vaughan industrial cleaners are sold. All grades are of the alkaline type and act by solution, chemical reaction, and emulsification. They speedily remove from the processed work combinations of animal, vegetable, and mineral oils, chemical additives, pigments, etc., normally employed in the manufacture of cutting oils, drawing compounds, rust preventives, quenching and tempering oils, and greases. Heat treatment salt residues also quickly respond to the action of 'Houghtoclean.'

The firm's leather packing division in Birmingham includes a well-equipped factory engaged in the production of 'Vim' packings. Precise methods of manufacture, high quality of material, and rigid inspection to ensure dimensional accuracy are maintained. 'Vim' leathers are impregnated to resist the action of the operating medium, pressure, and temperature.

## D. R. Rotor Loader

We have received from David Roberts & Co. (Engineers), Ltd., 276, Monument Road, Birmingham, 16, a leaflet describing the D.R. rotor-loader. This loader is a machine of revolutionary design for handling loose materials. Used with the 'Featherweight' articulating conveyors marketed by the firm, it forms a versatile and economic unit with which one man can load, transport, elevate, and deposit large volumes of material. It is now extensively used for coal and coke handling. The equipment is able to maintain a static discharge point, while the loading machine is freely manœuvrable to allow continuous operation.

## Asbestos and Allied Products

A new catalogue bearing the title 'Dick's Asbestos and Allied Products' has reached us from Dick's Asbestos and Insulating Co., Ltd., of Thames Road, Silvertown, London, E.16 (subsidiary of Thos. W. Ward, Ltd., Albion Works, Sheffield). This catalogue describes some of the more outstanding of the firm's asbestos products—packings, jointings, insulating materials, and the like—in a form which should make their identification and ordering straightforward and mistake-proof. It is emphasised, however, that the Company's technical staff is always at the service of the customer for assistance and advice. The catalogue is thus primarily a guide, which can be supplemented at any time by specific information on any problem concerning the application of asbestos to engineering purposes. The publication runs to a matter of 100 pages, and is excellently produced and illustrated.

## Electronic Control

Electrical transmitters have been operated for a number of years under adverse conditions in many industries. In the gas industry gas pressures and holder stocks are in many cases transmitted electrically. Often signals are used to control valves and to maintain constant pressure in distribution systems. Among the firms marketing equipment for the purpose is Evershed & Vignoles, Ltd.; and we were interested to receive recently a paper read by Mr. W. T. Marchant, Controls Manager of the firm, describing and illustrating the principles of operation and application of an electronic process control system to oil refining plants. There is no doubt that electrical methods offer considerable advantages to the process industries. Signals of product quality variables are in many cases of an electrical nature—*e.g.*, density, viscosity, humidity, and conductivity. To these may be added many end-point analysers which use the electrical medium for their operation.—*Evershed & Vignoles, Ltd., Acton Lane Works, Chiswick, London, W.4.*

## Organic Chemicals

L. Light & Co., Ltd. (Poyle Estate, Colnbrook, Bucks) have published the 1954 'Organic Chemicals Catalogue.' The new list covers a wide range of amino acids, peptides, biochemicals, nucleotides, sugars, enzymes, steroids, pterins, alkaloids, bile acids, vitamins, flavones, synthetic drugs, amines, chromatographic and analytical reagents, carcinogenic hydrocarbons, hydrides, solvents, nitriles, silanes, fluorines, monomers, acetylenics, hydrocarbons, photographic intermediates, quinoline, and pyridine derivatives.

## Diggers and Multipicks

Interesting particulars have reached us concerning Guiterman hand-operated diggers and multipicks. The multipick and square-hole digger range of tools are the scientific counterpart of the ordinary pick and shovel. They enable anybody to dig holes from 6 in. to 18 in. square up to 12 ft. deep from the surface of the ground and without putting a single foot in the hole. The hole is clean and square cut all the way down and the bottom is always level. Only the bare amount of earth necessary is removed.

The square-hole digger is used to dig and remove the earth from the hole. It also determines the dimensions of the hole. There are three models, the 6 in. one-man shovel and the standard two-men models 12 in. and 18 in. square. These hole dimensions are maintained right down to the bottom of the hole. The 6 in. model digs a hole 2 ft. 6 in. deep, but with the addition of either 12 in. or 24 in. extension pieces a hole 5 ft. deep can be dug by one man. The 12 in. and 18 in. models dig holes 3 ft. 6 in. deep, but by adding 24 in. extension sections the depth can be increased to 12 ft. The turning of a ratchet-operated handle in a to-and-fro motion closes the two blades of the digger and, after lifting its load of earth from the hole, the quick-release lever opens the jaws to discharge the earth. All working parts, including the blades, are manufactured from stainless steel, obviating the problem of rust.

The multipick consists of a steel tube enclosing a solid steel ram which is operated to provide a concentrated 14 lb. hammer blow per strike. The blow is always delivered directly on the required spot because the cutting edge of the tool is placed exactly where the blow is required. The handles on the tube casing and the ram striker are insulated up to 5,000 volts.

A selection of interchangeable tools is available to suit any digging condition or overcome difficult obstacles.—*S. Guiterman & Co., Ltd., 37, Soho Square, London, W.1.*

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# North Western Gas Output

Productivity figures for the North Western Gas Board Area released on March 8 show that in the four weeks ended January 24 output of gas per employee averaged 1,674 therms, compared with 1,659 therms in January, 1953—an increase of 1%.

In the first 10 months of the Board's financial year (April, 1953, to January, 1954) average output of gas per employee was 2½% higher than in the corresponding period 12 months earlier.

The number of employees in January, 1954, was 19,3796, compared with 20,262 in January, 1953, and 19,810 in January, 1952.

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**Midland Juniors.**—The half-day visit to Swan Village Gasworks, originally fixed for March 25, will take place on March 11; Mr. F. L. Atkin's paper on 'Integration Problems' will be read on March 23 instead of March 16; and President's Day has been altered from April 8 to April 1.

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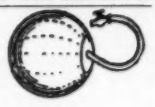

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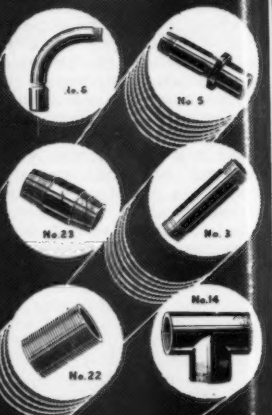


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"Gas Service" is the specialist magazine for the Sales and Service personnel of the Industry. It covers all aspects of gas service from the holder to the burner. In addition to sound editorials, news items and specially contributed articles, "Gas Service" also reports in the fullest possible manner the activities of the numerous Salesmen's Circles.

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**High Pressure Gas Main Construction** (Restall), **10s. 6d.**

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In addition to permanently binding subscribers' journals, (particulars and prices for which we shall be pleased to give on application) we can supply TEMPORARY BINDERS for the Gas Journal, Gas Service and King's Manual of Gas Manufacture, thus enabling readers to *bind their copies as received.* The danger of mislaid or damaged copies is eliminated.

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## APPOINTMENTS VACANT

*The engagement of persons answering these advertisements must be made through a Local Office of the Ministry of Labour or a Scheduled Employment Agency if the applicant is a man aged 18-64 inclusive or a woman aged 18-59 inclusive unless he or she, or the employment, is excepted from the provisions of the Notification of Vacancies Order, 1952.*

### WEST MIDLANDS GAS BOARD

INDUSTRIAL DEPARTMENT
TECHNICAL ASSISTANT—
DEVELOPMENT SECTION

**CANDIDATES should have a comprehensive** knowledge of fuel utilisation and possess qualifications in Gas Engineering, Mechanical Engineering or the Institute of Fuel.

The salary for the post will be within Grade VII (£565-£645 per annum) of the National Salary Scales for Gas Staffs.

The post is pensionable and the successful candidate may be required to pass a medical examination.

Applications, stating age, training, qualifications and experience, should be addressed to the Industrial Relations Officer, West Midlands Gas Board, 6, Augustus Road, Edgbaston, Birmingham, 15, to reach him within fifteen days of the appearance of this advertisement.

F. H. CURETON,
Secretary to the Board.

### SCOTTISH GAS BOARD

SOUTH EAST DIVISION
HOME SERVICE ADVISER

**APPLICATIONS are invited for the above post.** Candidates must be qualified in Domestic Science, preferably having a recognised Diploma covering two years' training in this subject, and be capable of conducting independent practical demonstrations of cooking and washing by gas, both to individuals and audiences, and of advising consumers on problems connected with the use of domestic gas appliances.

The salary offered will be within the range £316-£428 per annum, initial placing depending upon the qualifications and experience of the successful candidate, who may be asked to undergo medical examination and thereafter, if eligible, be required to contribute to the Board's Pension Scheme.

Applications detailing age, experience, present position, training and qualifications to be submitted not later than Saturday, March 27, 1954.

D. J. COLVIN,
Divisional Controller.

25, Chester Street,
Edinburgh, 3.

### SCOTTISH GAS BOARD

LANARKSHIRE DIVISION
HAMILTON DISTRICT
STATION ENGINEER

**APPLICATIONS are invited for the appointment** of STATION ENGINEER at the Hamilton District Undertaking.

The successful applicant will be responsible for the production of gas and residual products and the maintenance of the carbonising and ancillary plant at the Hamilton Station of the Lanarkshire Division.

The appointment carries a salary of Provincial A.A.P.T. VIII/X—£605-£790 per annum with placing according to qualifications and experience. If required, a rented house may be provided.

Candidates should be Corporate Members of the Institution of Gas Engineers and should be fully experienced in the control of modern Gas Works Plant.

Applications, appropriately endorsed, giving the names of two referees and full particulars of education, training and experience should reach the undersigned not later than Monday, March 29, 1954.

JAMES M. DOW,
Divisional Controller.

Divisional Offices,
Bothwell Road,
Uddingston.
March 3, 1954.

### NORTHERN GAS BOARD

NEWCASTLE DIVISION

**APPLICATIONS are invited for the position of** PLANT ENGINEER at the St. Anthony's By-Product Works of the above Division.

Candidates should have experience in the maintenance of plant in a By-Product Works engaged in Tar Distillation, Benzole Refining and Crude Tar Acids extraction including Steam Boilers, steam and electric pumps and should be qualified to at least the Higher National Certificate standard of an Engineering Institution.

The appointment will be subject to the terms and conditions of service set out in the agreement of the National Joint Council for Gas Staffs.

Commencing salary will be within the range of Grade A.P.T. VII (£565-£645).

The successful candidate will be required to pass a medical examination and be subject to the Board's Superannuation Scheme.

Applications stating age, training, qualifications and experience should be addressed to the undersigned within fourteen days of the publication of this notice.

JOSEPH E. WHITE,
Divisional General Manager.

30, Grainger Street,
Newcastle-upon-Tyne, 1.

### NORTH EASTERN GAS BOARD

WAKEFIELD GROUP
GROUP ACCOUNTANT

**APPLICATIONS are invited for the position of** GROUP ACCOUNTANT at a commencing salary of £1,075 per annum. A house at a reasonable rental is available.

The Wakefield Group has 140,000 consumers and one medium-size manufacturing Station, the bulk of the gas supplies being obtained from Coke Ovens, etc.

Applicants, suitably qualified, must be capable of supervising and controlling senior staff and co-ordinating the accounting organisation of a number of individual units. Experience of mechanised accounts and budgetary control will be an advantage.

The appointment is of a permanent nature and the successful candidate will be required to pass a medical examination and to join the Staff Pension Scheme.

Applications, giving all relevant details and names of two referees, must be received by the undersigned not later than Saturday, March 20, 1954.

J. C. GARDNER,
Secretary.

Bridge Street,
Leeds, 2.
March 3, 1954.

### WALES GAS BOARD

CARDIFF UNDERTAKING

**APPLICATIONS are invited for the position of** TECHNICAL ASSISTANT in the above-mentioned Undertaking.

Applicants must possess the Higher Grade Certificate (Manufacture) of the Institution of Gas Engineers and should have had extensive experience of the operation and control of Continuous Vertical Retorts, Carburetted Water Gas Manufacture and the ancillary plant appertaining thereto.

The salary offered is Grade A.P.T. VIII/A of the Salary Grade for Gas Staffs (£605 per annum rising to £685 by annual increments of £20).

The successful applicant may be required to undergo a medical examination before the appointment is confirmed.

Applications stating age, qualifications, experience, with details of present position, giving the names of two referees, should be forwarded to the undersigned within fourteen days of this publication.

J. POWDRILL,
General Manager and Engineer.

Gas Offices,
Bute Terrace,
Cardiff.


## PATENTS

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interest in a given commodity and enhance the potential of the Sales Staff. They can be used in a far more realistic way than black and white photographic prints to show off heavy machinery or a factory site. Understanding of blue-prints, service manuals, and the arrangement of complex machinery, cabling, piping, and lagging, to mention but a few examples, is made straightforward with the aid of 3-D colour slides. The foregoing remarks are addressed to the go-ahead Sales Managers, Maintenance Equipment Officers, P.R.O.s, and Publicity Managers. It will not cost them more than a 'phone call or a 2½d. stamp to find out more about this medium which is an up-to-date rendering of a very old principle. Enquiries to: **Walter King Photography, 11, Bolt Court, London, E.C.4.**, who are always in the lead with the latest developments of photography. And to firms whose policy it is to present regular pictures by means of projected slides, we have also something to offer—on 3-D lines of course!

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# industrial gas compressors

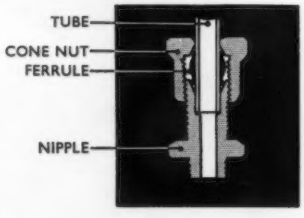
**FOR COMPRESSING AIR OR GAS SUPPLIES USED FOR FURNACE HEATING, METAL MELTING, BRAZING, SOLDERING BITS, LAUNDRY IRONS, ETC.**

**DIRECT COUPLED COMPRESSORS** (see illustration right) are fitted with automatic internal by-pass valves and lubrication systems. They are direct coupled to Keith Blackman motors. Type OA compressors in this range occupy a floor space of only 18" x 7½".
**CAPACITY RANGE:** 100 to 750 cub. ft. of gas or air per hour at 3 lbs. per sq. in. pressure.

**TYPE 4 COMPRESSORS** (not illustrated) are also fitted with automatic internal by-pass valves and lubricators. The complete unit includes motor and drive on a common bedplate, all of Keith Blackman manufacture.
**CAPACITY RANGE:** 500 to 20,000 cub. ft. of gas or air per hour at 3-5 lbs. per sq. in. pressure.
**AREA OCCUPIED:** from 9¼" x 16½" to 61" x 27".

## DID YOU KNOW?

KEITH BLACKMAN have been making compression joints for many years and the present design embodies features developed as a result of this long experience. Notice that the shape of the ferrule is such that the joint is made without unduly stressing the tube.




## serving to burn

*Note: the four burner heads (right) are for high pressure gas, or low pressure gas and air blast.*

**LEFT: "Fishtail" type burner** with two-armed stamped pattern injector for heating liquid in tanks by submerged combustion tubes. For use with low pressure gas supplies. **Size Range:** 1", 1¼", 1½", 2" and 2½" outlets. **Capacity Range:** 45-280 cub. ft. of gas per hour.

**Brass non-blow-off head types:** deal with 5 to 10 cub. ft. of gas per hour.

**Stainless steel, "F" type head, burner:** deals with 8 cub. ft. of gas per hour.

**Perforated head type burner:** deals with 10 to 15 cub. ft. of gas per hour.

Keith Blackman LIMITED
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'Phone: Tottenham 4522 (twelve lines) 'Grams: "Keithblac, Norphone, London"
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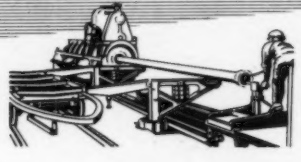
**INDUSTRIAL GAS EQUIPMENT**

524

Cochranes



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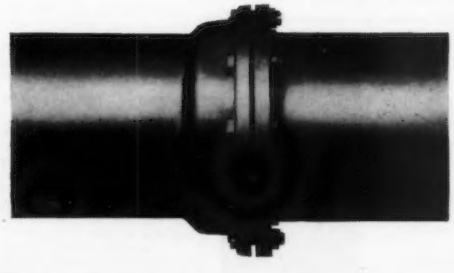
Cochranes
**SCREWED-GLAND FLEXIBLE JOINT**

The economies effected with this joint are immediate and lasting. For leaktight pipelines of 3–10" diameter, use Cochranes Screwed-Gland Flexible Joints.

Cochranes
**BOLTED-GLAND FLEXIBLE JOINT**

Jointing of larger pipes (12" diameter or over) is simplified by the use of Cochranes Bolted-Gland Flexible Joints. Like the Screwed-Gland, the Bolted-Gland Flexible Joint allows for 4° deflection.



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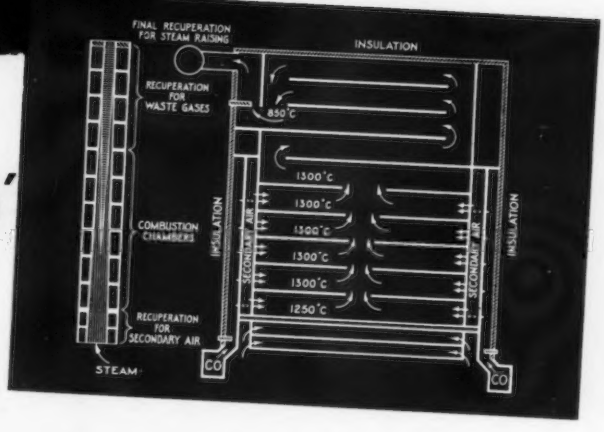


# 'BALANCED HEATING' saves fuel

"Balanced Heating", a feature of the Glover-West continuous vertical system of carbonization, reduces fuel consumption to a level hitherto unobtainable. In the "Balanced Heated" setting, producer gas enters the combustion chambers from *both* sides and retorts are evenly heated by *primary* combustion. Combustion proceeds towards the centre of the setting, heat transmitted to the outer walls being recovered in the producer gas and air uptakes and returned to the system. Control of temperature in individual combustion chambers gives greater flexibility—an important factor today when many different coals are handled by one plant.

★*Illustration shows a "Balanced Heated" setting under construction*

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The Neat burners have a quite exceptional performance. They:

Give perfect combustion with exceptional heat output for gas consumed.

Burn quite silently, there is no hiss even when the gas is turned down.

Cannot light back, however low the gas.

The two portable fires, FA/3 and FA/8, have unbreakable steel radiants, which have an *exceptionally* long life.

All F.A. Neat fires are made by the manufacturers of the famous Ascot gas water heaters to the same high standard of quality and performance.

To prevent accidents all models are fitted with guards conforming to the new British Standards Specification 1250.

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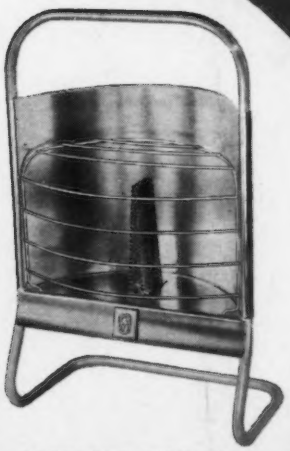

PORTABLE FIRE FA/3
Stands 19½ inches high.
Chromium plated reflector.

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